

Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid, and Resorcinol

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1.0 INTRODUCTION

Evidence exists that trace levels of the low molecular weight sulfonates, which may include benzene monosulfonic acid (BSA), p-phenol sulfonic acid (p-PSA) and benzene metadisulfonic acid (m-BDSA), are likely to be widespread in the environment. These compounds are present as constituents of the high-production detergents formulated from alkylbenzene sulfonates (Leslie, 1984) and other commercial products (Patel and Robbins, 1994). The widespread usage of these detergents since the 1940s in industrial, agricultural, and household applications has likely resulted in releases of these low molecular weight sulfonates. For example, benzene sulfonic acid has been qualitatively identified in drinking water in the United States by the Environmental Protection Agency (USEPA) (Abrams et al., 1975).

BSA and p-PSA are also found in surfactants used in the coal mining industry, in drilling fluid additives and in formulations for oil recovery operations. They are added to drilling muds as secondary emulsifiers to improve emulsion stability, as defoamers and as wetting agents for the drilled solids (Kjeilen et *al.*, 1999).

Reuse of foundry sands for road construction and fill, as was common prior to 1980, is a documented source for BSA entry into the environment. Used foundry sand contains a mix of chemicals used in mold and core production. Benzene sulfonic acid is commonly used as a hardening agent (Ji et *al.*, 2000; Matsura and Otsuka, 1987; Chang and Hurchings, 2001), and recent studies published in the scientific literature have documented that this chemical is readily leached into the environment when used foundry sand is exposed to environmental conditions. (Ji et *al.*, 2000; Riediker et *al*, 2000). BSA was measured at 128 ug/l in leachate from a landfill where used foundry sand had historically been placed (Riediker et al., 2000).

Since the low molecular weight sulfonates are not in the suite of organic compounds routinely evaluated by the US Environmental Protection Agency (USEPA) standard analytical methods, they have rarely been included as target analytes for environmental investigations. Additionally, neither the USEPA nor the Commonwealth of Pennsylvania have developed Ambient Water Quality Criteria (AWQCs) for these compounds. The USEPA has established a specific protocol for developing AWQCs (Stephan et al., 1985), and the Commonwealth of Pennsylvania has adopted this protocol. As stated in 25 Pa. Code § 16.22:

The Department will establish criteria for toxic substances to provide for protection of aquatic life in accordance with the following guidelines:

(1) For those toxics for which the EPA has developed criteria in accordance with the National guidelines as set forth in "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (1985), the Department will review and evaluate the criteria. If the Department determines that the criteria are adequate to protect indigenous aquatic communities in the State's waters, these criteria will serve as the basis for establishing ...effluent limitations under Chapter 92 (relating to National Pollutant Discharge Elimination System permitting, monitoring and compliance). If the Department determines that the EPA National criteria are inappropriate, the Department will adjust these criteria in



- accordance with National guidelines to reflect the levels required for protection of aquatic life in this Commonwealth's waters.
- (2) For those toxics identified or expected in a discharge for which the EPA has not developed criteria, the Department will develop criteria using the EPA's National Guidelines.

In developing acute AWQCs using the USEPA protocol as specified in item (1) above, Stephan *et al.* (1985) require acute toxicity test data from at least eight different families to represent the potential range of aquatic biota and their respective sensitivities to a compound that might be observed in the field. These eight data requirements are presented in Table 1, and typically, these data consist of 48-hr LC₅₀ data for *daphnids* and the 96-hr LC₅₀ data for fish (concentrations lethal to 50 percent of the test organisms after a 48- or 96-hour exposure period, respectively). These data are used to calculate the final acute value (FAV). The FAV is an estimate of the concentration of a chemical corresponding to a cumulative probability of 0.05 (i.e. the 5th percentile) of the acute toxicity values for the genera with which acceptable acute toxicity tests have been conducted for that chemical (Stephan et *al.*, 1985)

In addition to the data requirements for developing criteria using the USEPA method as adopted by Pennsylvania and specified in Table 1, toxicity test data from an algae or vascular plant are desirable, but not required, for calculation of the final plant value. Stephan et al. (1985) also specify that the final residue value (FRV) be determined where "the final Residue Value is intended to (a) prevent concentrations in commercially or recreationally important aquatic species from affecting marketability because of exceedance of applicable FDA Action Levels and (b) protect wildlife, including fishes and birds that consume aquatic organisms from demonstrated unacceptable effects."

The chronic AWQC can be derived using the same protocols if chronic toxicity test data for eight species are available. However, because chronic toxicity testing is expensive and time consuming, chronic criteria are typically developed by dividing the FAV by an acute to chronic ratio (ACR) developed from one or a few paired acute and chronic toxicity tests run in the same laboratory. The guidance developed by Stephan et *al.* (1985), used by USEPA and adopted by Pennsylvania, specifies three data requirements for developing an ACR:

- 1. At least one species is a fish
- 2. At least one species is an invertebrate
- 3. At least one species is an acutely sensitive freshwater species (the other two may be saltwater species).

If all three data requirements are met, then the final ACR is calculated as the geometric mean of the three values. USEPA (1995) has specified that in the absence of one or more ACR values, a default value of 18 should be substituted in the calculation of the final ACR. In the absence of any chemical-specific ACR information, the default value of eighteen is assumed to be the final ACR.

The FAV is divided by two to calculate the criterion maximum concentration (CMC). The FAV is divided by the final ACR to calculate the final chronic value. The criterion continuous concentration (CCC) is defined (Stephan et *al.*, 1985) as the lowest of the final chronic value,



the plant value, or the residue value. The CMC and the CCC are acute and chronic criteria, respectively, and are defined by Stephan et *al.* (1985) as:

The procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" indicate that, except where a locally important species is very sensitive, freshwater aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of the tested material does not exceed the Criterion Continuous Concentration more than once every three years on average and if the one hour concentration does not exceed the Criterion Maximum Concentration more than once every three years on average.

More recently, the USEPA (1995) has developed additional protocols for establishing wildlife criteria and has deleted the provision in the guidelines to use a Final Residue Value (FRV) in deriving a chronic criterion.

The initial source for data used in this study to identify preexisting chemical-specific toxicity test results is the USEPA ecotoxicology database (ECOTOX) (USEPA, 2003). ECOTOX is a source for locating single chemical toxicity data from three USEPA ecological effects databases: AQUIRE, TERRETOX, and PHYTOTOX. The AQUIRE database currently holds more than 232,000 records on lethal, sub-lethal and residue effects in aquatic species for over 7,300 chemicals. The database was most recently updated in February of 2006; however, the most recently posted data for resorcinol and/or the sulfonates were uploaded in the September 2003 update (USEPA, 2006).

For each chemical, ECOTOX was queried using the Chemical Abstracts Service Registration Number (CAS#). All records for aquatic plants and animals were downloaded in delimited report format. For aquatic species, the most appropriate toxicological endpoint for FAV derivation is the LC_{50} , the chemical concentration that was lethal to 50% of the test animals in a specified time period. As specified in Stephen et *al.* (1985), a 48-hour freshwater EC_{50} (death or immobilization) and/or LC_{50} is acceptable for *Daphnia* species. For fish, the 96-hour freshwater LC_{50} for aquatic species was selected for derivation of the FAV. As also specified in the guidelines, when more than one freshwater LC_{50} was available for several species within a genus, the geometric mean of all the data was calculated to represent the Genus Mean Acute Value (GMAV). The GMAVs were then used to calculate the FAV.

The relevant ECOTOX search records for each compound are presented in Tables 2 and 3. Highlighted records indicate data that met the USEPA AWQC guidelines calculation criteria, while records that are not highlighted were not included in any AWQC calculation. The rationale for not using data includes the following:

- Documentation codes which were classified as "I" (insufficient methods and results)
- Exposure times were less than or greater than USEPA (Stephan et al., 1985) guidelines
- Effect endpoints or measurements which were mortality-based (e.g. percent survival or percent mortality rather than LC₅₀s) or concentration means were not recorded
- The test was conducted with saltwater media, or the medium was "Not Reported"
- Toxicity endpoints were "Not Reported"
- The data were inapplicable based on review of the original literature



A search of the database revealed no aquatic toxicity test records for m-BDSA. Consequently, to derive AWQCs for this compound, *de novo* bioassays were performed to meet all of the USEPA guideline criteria for the various genera presented in Table 1.

The ECOTOX query for BSA yielded only one result (Table 3); however, the data from this study could not be utilized because the test duration (>4 days) did not meet the 48-hr exposure guideline specified for a planktonic crustacean (*Daphnia magna*) in the USEPA guidelines. Consequently, to derive AWQCs for this compound, *de novo* bioassays were performed to meet all of the criteria for the various genera presented in Table 1.

The ECOTOX database contained ten records for p-PSA (Table 3). Of these, only two appeared to meet current USEPA testing guidelines for use in deriving AWQC based on test species and duration requirements (Stephan et *al.*, 1985). One was a single 48-hr LC₅₀ for *Daphnia magna* and the second was a 96-hr LC₅₀ for *Lymnaea sp* (pond snail). Both of these LC₅₀s were published in a 1965 paper (Dowden and Bennett, 1965). Because these tests were conducted over 40 years ago and USEPA has specific aquatic toxicity test requirements for toxicity test results to be usable, the papers were reviewed in detail. A separate summary of the review is provided below for *daphnia magna* and pond snail.

Dowden and Bennett (1965) did not present details of the experimental methods for the *daphnia magna* tests. The authors cite a 1948 grey literature source that appears to no longer be available to the general public. Consequently, it was not possible to verify that USEPA guidelines were adhered to. Specifically, it was not possible to determine whether neonatal organisms (less than 24 hours old) were used in the test (as required by USEPA guidelines; Stephan et *al.*, 1985; Section IV) or whether the animals were fed during the test (which is not allowed under the USEPA guidelines (Stephan et *al.*, 1985; Section IV). It appears that the *daphnids* were fed based on review of cross-referenced articles cited in Dowden and Bennett (1965) for general methodologies. In addition, reference water was obtained from a university lake and though it may not be a variable between the spiked tests and the control, current protocols require laboratory derived water. Because of the factors above, the results from the Dowden and Bennett (1965) *daphnia* toxicity tests are not used in AWQC derivation.

Dowden and Bennett (1965) also reported a 96-hr LC50 for *Lymnaea sp* (the pond snail). Detailed review of the article reveals the species of snail tested was not identified and minimal specific information is provided on the test protocols. As with the *daphnia magna* tests, reference water was obtained from a nearby waterbody and not generated in a laboratory, as current protocol requires. Because of these uncertainties, the data reported for the pond snail by Dowden and Bennett (1965) were not used to derive the AWQC for p-PSA. Only the *de novo* p-PSA test data (Table 7) were used.

The query for resorcinol yielded 37 relevant records covering twelve different species (Table 2). Some of these data satisfied seven of the eight existing USEPA acute aquatic toxicity test guideline criteria (Table 2) and therefore were used for the calculation of GMAVs and FAVs. Acute and chronic *Chironomus tentans* data were also run *de novo* to allow for calculation of an ACR.

In addition to the ECOTOX data, there were two very comprehensive bioassay test reports published by the Resorcinol Task Force (Springborn Smithers Laboratories, 2004; 2006) that utilized a full life cycle flow through test on the water flea *Daphnia magna* (25 – 400 ug/L



nominal; 11 – 172 ug/L measured) and an acute 72-hour test on the green alga *Pseudokirchneriella subcapitata* (3.1 – 100 ug/L nominal; 3 – 97 measured). The data from these reports are summarized in Attachment 1. There were no significant dose-related effects reported for either species, even at the highest doses, nor could any endpoints be calculated because of the lack of any discernable dose-response. The test endpoints included survival and reproduction in *Daphnia magna* (the latter of which appeared to be stimulated by resorcinol) and effects on growth and biomass in the green algae. Because the exposure concentrations were below the data obtained from ECOTOX and there were no clear dose-response relationships, these data were not used in the calculation of AWQCs. However, they are mentioned here to ensure that all existing reports are documented for the sake of completeness.

The remainder of this report summarizes the development of toxicity test information to satisfy all eight data requirements for calculating acute and chronic AWQCs for M-BDSA, p-PSA, BSA and, resorcinol¹. Section 3 presents the test organisms and the procedures used to develop the toxicity test information. Data summaries are presented in Section 4, and Results and Discussion are presented in Section 5.

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¹ This report is a revision of a June 2005 report and includes recent chronic aquatic toxicity results from 2004 and 2006 tests sponsored by the Resorcinol Task Force (RTF) on *daphnia magna* and green algae (Springborn Laboratories, 2004; 2006). This revised report also includes toxicity data for p-PSA which were posted to ECOTOX in September 2003 (after preparation of the 2005 report). However, the results are from tests conducted in 1965.



2.0 PROCEDURES

A series of acute and chronic bioassays were conducted on four chemicals for up to eight species. An initial range-finding test was conducted for each species of interest to estimate a no-effect and a toxicity threshold. These data were then used to determine the range of concentrations for subsequent definitive testing. The chemicals tested were benzene metadisulfonic acid (m-BDSA), benzene monosulfonic acid (BSA), p-phenol sulfonic acid (p-PSA), and resorcinol. The species used for this study were the freshwater daphnid *Ceriodaphnia dubia*, the fathead minnow *Pimephales promelas*, the amphipod *Hyalella azteca*, the midge larva *Chironomus tentans*, the rainbow trout *Oncorhynchus mykiss*, the bluegill sunfish *Lepomis macrochirus*, the freshwater rotifer *Brachionus calyciflorus*, and the mosquito larvae *Culex pipiens* (Table 4). The rotifer tests were conducted in April 2003 at the AMEC Northwest Bioassay Laboratory located in Fife, Washington. All other testing was conducted between 27 November 2002 and 30 April 2003 at the AMEC San Diego Bioassay Laboratory (AMEC Laboratory), California.

2.1 MATERIALS AND METHODS

Chemicals m-BDSA, BSA, and p-PSA were sent to the AMEC Laboratory from AMEC's Westford, MA office. Westford obtained m-BDSA and p-PSA from ABCR Gmbh & Co. in Germany (CAS#'s 831-59-4 and #825-90-1, respectively), and BSA from Aldrich Chemical (CAS# 515-42-4). The AMEC Laboratory obtained resorcinol from Sigma-Aldrich (CAS# 108-46-3) (Appendix E).

2.1.1 Organism Procurement and Handling

2.1.1.1 Daphnid

Ceriodaphnia dubia were cultured at the AMEC Laboratory. Four to five days prior to test initiation, adult female daphnids were isolated from batch cultures and placed in individual holding cups. The number of daphnids isolated was equal to the number of neonates required to initiate testing. Each cup contained 15 milliliters (ml) of dilution water. A diet consisting of vitamin-enriched yeast, Cerophyll®, and trout chow (YCT) and Selenastrum suspension was added to each cup daily. Cups were placed in a temperature-controlled room maintained at 25±1°C. Isolated females were transferred to cups containing fresh dilution water every 24 hours prior to test initiation. Females that produced broods of 8 or more neonates (<24 hours old) were isolated and their offspring combined in a single 500-ml crystallizing dish, fed, placed in an environmental chamber at 25±1°C, and held for two hours prior to test initiation.



2.1.1.2 Fathead Minnow, Rainbow Trout and Bluegill

Pimephales promelas larvae were obtained from Aquatic BioSystems in Fort Collins, Colorado. Oncorhynchus mykiss were obtained from Thomas Fish Supply in Anderson, California. Lepomis macrochirus were obtained from Osage Catfisheries, Inc. in Osage Beach, Missouri. Organisms were transported in oxygen-saturated water contained in plastic bags and shipped by overnight delivery service in insulated ice chests. Upon arrival at AMEC, organism receipt information was recorded, animal condition specified, and physical parameters including pH, DO, conductivity, and temperature were measured and recorded. The organisms were acclimated to test conditions in order to promote and confirm animal health prior to test initiation. During the acclimation period, animals were observed for any indications of stress (abnormal swimming behavior, discoloration) or significant mortality (>10%). The fathead minnows were fed freshly hatched brine shrimp (Artemia sp.). Rainbow trout and bluegill were fed Tetramin[®] flake food to satiation. Fathead minnow larvae were 12-14 days old post-hatch, rainbow trout were 16 days old, and bluegill were 60-90 days old upon test initiation.

2.1.1.3 Amphipod and Midge Larvae

Hyalella azteca and Chironomus tentans were obtained from Aquatic BioSystems in Fort Collins, Colorado. The amphipods were sorted by size class and placed in oxygen-saturated water contained in 500-ml plastic containers with fine screens at the bottom for use as a substrate. The midge larvae were placed in oxygen-saturated water contained in 500-ml plastic containers with paper towels as a substrate. All organism containers were packed into insulated ice chests and shipped by overnight delivery service. Upon arrival at AMEC, organism receipt information was recorded, animal condition specified, and physical parameters including pH, DO, conductivity, and temperature were measured and recorded. The organisms were acclimated to test conditions in order to promote and confirm animal health prior to test initiation. During the acclimation period, animals were observed for any indications of stress (abnormal swimming behavior, discoloration) or significant mortality (>10%), and fed a mixture of dilution water and Tetramin[®] flake food to satiation. Amphipods were 9-12 days old; midge larvae were in the second instar stage upon test initiation.

2.1.1.4 Rotifer

Brachionus calyciflorus cysts were obtained from MicroBioTests Inc. located in Deinze, Belgium. Dry cysts were shipped in 1 ml plastic vials and were received on 1 April 2003 (Lot BC000505, expiry 07/31/03). Cysts were stored in the dark at 4°C until use.

2.1.1.5 Mosquito Larvae

Culex pipiens were obtained from Carolina Biological Supply in Burlington, North Carolina. The larvae were placed in plastic bags filled with oxygen-saturated water and shipped in an insulated ice chest by overnight delivery service. Upon arrival at AMEC, organism receipt information was recorded, animal condition specified, and physical parameters including pH, DO, conductivity, and temperature were measured and recorded. The organisms were acclimated to test conditions in order to promote and confirm animal health prior to test initiation. During the acclimation period, animals were observed for any indications of stress (abnormal



swimming behavior, discoloration) or significant mortality (>10%), and fed a mixture of dilution water and ground trout chow.

2.1.2 Bioassay Protocol

2.1.2.1 Daphnid & Fathead Minnow

Acute *Ceriodaphnia dubia* and *Pimephales promelas* bioassays were conducted in accordance with USEPA protocols outlined in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms," Fourth Edition (EPA/600/4-90/027F, 1993). Chronic *Ceriodaphnia dubia* bioassays were conducted in accordance with USEPA protocols outlined in "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms," Third Edition (EPA/600/4-91/002, 1994).

2.1.2.2 Amphipod & Midge Larvae

The USEPA protocols do not provide guidance for developing aquatic toxicity tests using amphipods and midge larvae. *Hyalella azteca* and *Chironomus tentans* bioassays were, therefore, conducted using procedures modified from USEPA protocols outlined in "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition" (2000) and with American Society for Testing and Materials (ASTM) protocols outlined in "Standard Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates," E 1383-94 (1994). The protocols in both of these documents were developed for sediment toxicity tests, so slight modifications of the procedures were necessary to accommodate water-only exposures.

2.1.2.3 Rainbow Trout & Bluegill

The USEPA protocols do not provide guidance for developing aquatic toxicity tests using early life stages of these species. Therefore, acute *Oncorhynchus mykiss* and *Lepomis macrochirus* bioassays were conducted in accordance with ASTM protocols outlined in "Standard Guide for Conducting Early Life-Stage Toxicity Tests with Fishes" (ASTM E1241-98).

2.1.2.4 Rotifer

The USEPA protocols do not provide guidance for developing acute or chronic aquatic toxicity tests using rotifers. Acute *Brachionus calyciflorus* bioassays were, therefore, conducted in accordance with ASTM protocols outlined in "Standard Guide for Acute Toxicity Test with the Rotifer Brachionus," (ASTM E1440-91). Chronic tests followed methods described in "A 2-day Life Cycle Test with the Rotifer *Brachionus calyciflorus*" (Snell, 1992).

2.1.2.5 Mosquito Larvae

The USEPA protocols do not provide guidance for developing aquatic toxicity tests using mosquito larvae. Therefore, acute *Culex pipiens* bioassays were conducted in accordance with ASTM protocols outlined in "Standard Guide for Conducting Acute Toxicity Tests on Test Materials with Fishes, Macroinvertebrates, and Amphibians" (ASTM E729-96).



2.2 TEST DESIGN

The test designs are summarized in the following sections.

2.2.1 Range-finding Tests

Daphnia, fathead minnow, amphipod, and midge larvae acute toxicity range-finding tests were conducted using the following concentrations: 0.1, 1.0, 10, 100, and 1,000 milligrams per liter (mg/L). Working stock solutions of 10,000 mg/L were made by weighing 10 g of each chemical into 1-L volumetric flasks and adding Nanopure deionized water. A chronic range-finding test with the same exposure concentrations was conducted using *Ceriodaphnia* only. Rainbow trout, rotifer, and bluegill acute toxicity range-finding tests were conducted using the following concentrations: 10, 100, 500, 1000, 5000, and 10,000 mg/L. Working stock solutions for these tests of 100,000 mg/L were made by weighing 100 g of each chemical into 1-L volumetric flasks and adding Nanopure deionized water.

2.2.1.1 Daphnid Acute Survival

One day prior to test initiation, a batch of moderately hard dilution water was prepared (eight parts Nanopure deionized water to two parts Perrier mineral water) and aerated overnight. The pH and hardness of the dilution water were measured and recorded to ensure that they were within the ranges designated in the protocol (pH 7.9-8.3; hardness 80-100 mg/L). Alkalinity was also measured and recorded to monitor its consistency in standard laboratory dilution water.

Thirty-ml polystyrene containers were used as test chambers. Three replicate cups were used for each concentration. Test chambers were placed in a polycarbonate holder with holes numbered sequentially from 1 to 18. A template that identified the test concentration and replicate contained in each hole was prepared and maintained.

Test solutions were prepared by measuring the appropriate amount of chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. Fifteen ml of test solution were distributed to each test chamber. Test chambers were placed in a 25°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, five neonates were arbitrarily collected from the organism holding bowl and distributed to each test chamber. All counts were verified under a dissecting microscope. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle. Mortality was monitored for each test chamber at 24 and 48 hours. Measurements of the physical parameters pH, DO, conductivity, and temperature were recorded in each test concentration at the end of the 48-hour test in a composite sample comprised of the contents of the three replicate test chambers. The acceptability criterion for this test is mean control survival of 90 percent at exposure termination.



2.2.1.2 Daphnid Chronic Survival and Reproduction

One day prior to test initiation, a batch of moderately hard dilution water was prepared (eight parts Nanopure deionized water to two parts Perrier mineral water) and aerated overnight. The pH and hardness were measured and recorded to ensure they were within the ranges designated in the protocol. Alkalinity was also measured and recorded to monitor its consistency in our dilution water.

Thirty-ml polystyrene containers were used as test chambers. Five replicate cups were used for each concentration. Test chambers were placed in a polycarbonate holder with holes numbered sequentially from 1 to 30. A template that identified the test concentration and replicate contained in each hole was prepared and maintained.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. Fifteen ml of test solution were distributed to each test chamber. Test chambers were placed in a 25°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, one neonate was arbitrarily selected from the organism holding bowl and distributed to each test chamber. The presence of a single neonate was verified under a dissecting microscope. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle. During the next seven days, each test chamber was monitored daily for offspring production, mortality, and sublethal effects. Daily renewals of test solution were made by transferring each adult to a new chamber containing fresh test solution of the corresponding concentration. After offspring counts were recorded, the used test solution was pooled by concentration and pH, DO, temperature, and conductivity were measured. At test termination, final observations were made, water quality parameters were recorded, and test animals were discarded. Control acceptability criteria for this test are mean survival of 80 percent and 60 percent of surviving females producing three or more broods with an average total of 15 neonates produced per organism.

2.2.1.3 Fathead Minnow Acute Survival

One day prior to test initiation, a batch of moderately hard dilution water was prepared (eight parts Nanopure deionized water to two parts Perrier mineral water) and aerated overnight. The pH and hardness were measured and recorded to ensure that they were within the ranges designated in the protocol. Alkalinity was also measured and recorded to monitor its consistency in our dilution water.

The test chamber used for the fathead minnow test was a 1-L plastic beaker. Two replicate cups were tested for each concentration.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 250 ml of test solution were distributed to each test chamber. Test chambers were placed in a 20°C environmental



chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, ten healthy fish larvae were arbitrarily selected and placed in each test chamber. Counts and initial condition of all organisms were verified by a second technician. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle.

Mortality and observable sublethal effects were monitored and documented daily. Water quality parameters (pH, DO, temperature, and conductivity) were measured daily in one replicate from each test concentration. The test was performed under static conditions; there was no renewal of the test solutions. Animals were fed freshly hatched brine shrimp (*Artemia*) at 48 hours. At 96 hours, final water quality measurements were recorded, final counts and observations were documented, and the test animals were discarded. The acceptability criterion for this test is mean control survival of 90 percent at test termination.

2.2.1.4 Amphipod & Midge Larvae Acute Survival

One day prior to test initiation, a batch of moderately hard dilution water was prepared (eight parts Nanopure deionized water to two parts Perrier mineral water) and aerated overnight. The pH and hardness were measured and recorded to ensure that they were within the ranges designated in the protocol. Alkalinity was also measured and recorded to monitor its consistency in our dilution water. It is notable that moderately hard water is not typically the dilution water used for these two species. It was chosen for the range-finding phase of the study for consistency and comparability across species, but may have contributed to observed variability and was not used for definitive exposures.

Test chambers for these exposures were 1-L glass jars. Three replicate jars were used for each test concentration. *Hyalella* were provided with a 1 in² piece of fine-mesh screen as a substrate. *Chironomus* were provided with 2 tablespoons per replicate of clean rinsed beach sand collected from Torrey Pines Beach in La Jolla, CA.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 250 ml of test solution were distributed to each test chamber. Test chambers were placed in a 20°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, ten healthy-appearing *Hyalella* juveniles or *Chironomus* larvae were arbitrarily selected and distributed to the appropriate test chambers. Counts and initial condition of all organisms were verified by a second technician. When initial observations were complete, tests were returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle.

Water quality parameters (pH, DO, temperature, and conductivity) were measured daily in one replicate from each test concentration. The test was performed under static conditions, there was no renewal of the test solutions. Animals were not fed during the 96-hour exposure period. At test termination, final water quality measurements were recorded, final counts and observations were made and documented, and test animals were discarded. Control acceptability criteria for *Hyalella* and *Chironomus* exposures are mean survival results of 80 and 70 percent, respectively at the end of the exposure.



2.2.1.5 Rainbow Trout Acute Survival

One day prior to test initiation, a batch of moderately hard dilution water was prepared (eight parts Nanopure deionized water to two parts Perrier mineral water) and aerated overnight. The pH and hardness were measured and recorded to ensure that they were within the ranges designated in the protocol. Alkalinity was also measured and recorded to monitor its consistency in our dilution water.

The test chambers were 1-L glass containers. Four replicate chambers each containing five organisms were used for each test concentration.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 500 ml of test solution were distributed to each test chamber. Test chambers were placed in a 13°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, ten trout were arbitrarily selected and to each test chamber. Counts and initial condition of all test organisms were verified by a second technician. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle.

Mortality and observable sublethal effects were monitored and documented daily. Water quality parameters (pH, DO, temperature, and conductivity) were measured and recorded daily in one replicate from each test concentration. The test was performed under static conditions; there was no renewal of the test solutions. Animals were not fed during the exposure. At 96 hours, final water quality measurements were recorded, final counts and observations were documented, and the test animals were discarded. The control acceptability criterion for this test is a mean survival of 90 percent at the end of the exposure.

2.2.1.6 Bluegill Acute Survival

One day prior to test initiation, a batch of Culligan-filtered water (Culligan) was prepared as dilution water and aerated overnight. Culligan was obtained from a city water line connected to a permanent series of filters. The filters are maintained on a regular service schedule.

The test chambers consisted of 1-L glass containers. Each concentration consisted of two replicate chambers with five organisms in each.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 500 ml of test solution were distributed to each test chamber. Test chambers were placed in a 20°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, ten bluegills were arbitrarily selected and placed into each test chamber.

Counts and initial condition of all test organisms were verified by a second technician. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle.



Mortality and observable sublethal effects were monitored and documented daily. Water quality parameters (pH, DO, temperature, and conductivity) were measured and recorded daily in one replicate from each test concentration. The test was performed under static conditions; there was no renewal of the test solutions. Animals were not fed during the exposure. At 96 hours, final water quality measurements were recorded, final counts and observations were made, and the test animals were discarded. The acceptability criterion for this test is a mean control survival of 90 percent at the end of the exposure.

2.2.1.7 Rotifer Acute Survival

Rotifer cyst hatching was initiated one day prior to starting the acute tests. A vial of cysts was rinsed into a Petri dish containing approximately 40 ml of moderately hard synthetic freshwater. The Petri dish was then placed in a 25°C environmental chamber under continuous light. Test chambers consisted of covered 48multi-well tissue culture plates. There were three replicates per concentration in the range-finding tests.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. The test solutions were then distributed in 0.5 ml aliquots to wells in the test chamber. The culture plate was then placed in a 25°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Rotifer cysts were distributed to test chambers within two hours of hatching. Five healthy appearing rotifer neonates were arbitrarily selected and distributed to each test chamber. Organisms were not fed during the test. Counts and initial condition of all organisms were verified by a second technician. When initial observations were complete, the multiwell plate was wrapped in aluminum foil to provide complete darkness and returned to the environmental chamber. Cups containing 100-ml of each test concentration for use in monitoring water quality parameters were prepared as surrogates, covered with aluminum foil, and placed in the environmental chamber.

Mortality was evaluated and recorded after 24 hours of exposure. Water quality parameters (pH, DO, temperature, and conductivity) were measured and recorded from each test concentration. The test was performed under static conditions; there was no renewal of the test solutions. The acceptability criterion for this test is a mean control survival of 90 percent at the end of the exposure.

2.2.1.8 Mosquito Larvae Acute Survival

One day prior to test initiation, a batch of Culligan dilution water was prepared and aerated overnight. The test chamber used for the mosquito larvae test was a 400-ml plastic beaker. Three replicate cups were tested for each concentration.

Test solutions were prepared by measuring the appropriate amount of the chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 250 ml of test solution were distributed to each test chamber. Test chambers were placed in a 20°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, five healthy



appearing larvae were arbitrarily selected and distributed to each test chamber. Counts and initial condition of all organisms were verified by a second technician. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle.

Mortality and observable sublethal effects were monitored and recorded daily. Water quality parameters (pH, DO, temperature, and conductivity) were measured daily in one replicate from each test concentration. The test was performed under static conditions; there was no renewal of the test solutions. Animals were fed a mixture of water and ground trout chow at 48 hours. At 96 hours, final water quality measurements were recorded, final counts and observations were documented, and the test animals were discarded. The control acceptability criterion for this test is a mean survival of 70 percent. A published acceptability criterion does not currently exist for this species. The 70 percent value was derived internally based on our experience with the organism and is equivalent to that recommended in EPA 2000 for another aquatic insect, *Chironomus tentans*.

2.2.2 Definitive Tests

Acute and chronic bioassays with daphnia and acute bioassays using fathead minnow, amphipod, and midge larvae were conducted with m-BDSA, BSA, and p-PSA. concentrations tested were 500, 1,000, 2,000, 4,000, 8,000, and 10,000 mg/L. Working stock solutions of 100,000 mg/L were made by weighing 100 g of each of these chemicals into 1-L volumetric flasks and adding Nanopure filtered water. Acute and chronic bioassays for the midge larvae were conducted with resorcinol using concentrations of 100, 250, 500, 750, 1,000, and 2,000 mg/L. A working stock solution of 10,000 mg/L was made by weighing 10 g of resorcinol into a 1-L volumetric flask and adding Nanopure filtered water. Rainbow trout, bluegill, and mosquito larvae acute toxicity bioassay tests were conducted using the following concentrations of m-BDSA, BSA, and p-PSA: 10, 100, 500, 1000, 5000, and 10,000 mg/L. Working stock solutions for these tests of 100,000 mg/L were made by weighing 100 g of each chemical into 1-L volumetric flasks and adding Nanopure filtered water. Acute and chronic bioassays with rotifers were conducted with m-BDSA and BSA at concentrations of 625, 1,250, 2,500, 5,000, and 10,000 mg/L and with p-PSA at concentrations of 1,250, 2,500, 5,000, 10,000, 20,000 mg/L. Working stock solutions of 100,000 mg/L were made as for the daphnia tests.

2.2.2.1 Daphnid Acute Survival

Procedures for these bioassays were identical to those used for range-finding bioassays with two exceptions:

- 1) There were four replicate test chambers per test concentration rather than three; and;
- 2) Test chambers were placed in a polycarbonate holder with holes numbered sequentially from 1 through 28.

2.2.2.2 Daphnid Chronic Survival and Reproduction

Procedures for these bioassays were the same as those for range-finding bioassays with two exceptions:



- 1) There were ten replicate test chambers per test concentration rather than five and;
- 2) Test chambers were placed in a polycarbonate holder with holes numbered sequentially from 1 through 70.

2.2.2.3 Fathead Minnow Acute Survival

Procedures for these bioassays were the same as those used for range-finding tests with the exception of four replicate test chambers per test concentration rather than two.

2.2.2.4 Amphipod & Midge Larva Acute Survival

Procedures for these bioassays were the same as those used for range-finding tests with two exceptions:

- 1) There were five replicate test chambers per test concentration rather than three and;
- 2) Culligan was used as dilution water rather than moderately hard water. This is the typical dilution water for *Hyalella* and *Chironomus*.

2.2.2.5 Midge Larvae Chronic Survival and Growth

Test chambers for this bioassay consisted of 1-L glass jars. Five replicate jars were used for each test concentration. *Chironomus* were provided with 2 tablespoons of clean beach sand collected from Torrey Pines Beach in La Jolla, CA as a substrate. Dilution water consisted of Culligan water. The source of water was changed from range-finding exposure due to the possibility that the moderately hard dilution water preparation used during that phase of the study impacted animal survival and increased variability.

Test solutions were prepared by measuring the appropriate amount of the resorcinol chemical stock solution into a volumetric flask and adding dilution water. The pH, DO, temperature, and conductivity in each test concentration were measured and recorded. 250 ml of test solution were distributed to each test chamber. Test chambers were placed in a 20°C environmental chamber to allow the solutions to equilibrate prior to test initiation. Upon initiation, ten healthy appearing *Chironomus* larvae were arbitrarily selected and distributed to the appropriate test chambers. Counts and initial health of all organisms were verified by a second technician. When initial observations were complete, the test was returned to the environmental chamber. Light was provided with cool-white fluorescent bulbs and maintained on a 16:8 hour light:dark cycle. Mean initial weight of the *Chironomus* was determined by placing five arbitrarily selected organisms on five replicate-tared plastic pans. The pans were then placed in an oven at 65°C overnight and weighed the following day.

Water quality parameters (pH, DO, temperature, and conductivity) were measured daily in one replicate from each test concentration. The test was performed under static conditions; there was no renewal of test solutions. Animals were fed a mixture of Culligan and Tetramin[®] flake food every 2-3 days during the 10-day exposure period. At test termination, final water quality measurements were recorded, and final counts and observations were made. Surviving test animals then were transferred to tared plastic pans and placed in a drying oven at 65°C overnight. Dry weights were measured and the average growth per organism was estimated relative to the initial weight data collected on test day zero.



2.2.2.6 Rainbow Trout Acute Survival

Due to the results of the range-finding series, identical concentrations were used for the definitive series. Procedures for these bioassays were the same as those used for range-finding tests.

2.2.2.7 Bluegill Acute Survival

Due to the results of the range-finding series, identical concentrations were used for the definitive series. Procedures for these bioassays were the same as those used for range-finding tests with the exception of testing three replicates instead of two.

2.2.2.8 Rotifer Acute Survival

Procedures for these bioassays were identical to those used for range-finding bioassays with the exception of using eight replicate test chambers per test concentrations rather than three.

2.2.2.9 Rotifer Chronic Population Increase

Procedures for the chronic bioassays were identical to those used for range-finding bioassays with the following exceptions:

- 1) There were eight replicate chambers, rather than three;
- 2) There was one rotifer neonate added to each well in the tissue culture plate, rather than five:
- 3) Organisms were fed by adding 1 x 10⁶ Selenastrum capricornutum cells per rotifer:
- 4) Final number of organisms in each test chamber was counted and recorded after 48 hours of exposure and rate of population increase was calculated; and
- 5) Test acceptability criterion was control performance of $r \ge 0.7$ (r is the intrinsic rate of population increase).

2.2.2.10 Mosquito Larvae

Due to the increased variability and low survival throughout the range-finding series, the definitive study was conducted using identical concentrations. Procedures for these bioassays were the same as those used for range-finding tests with two exceptions:

- 1) There were five replicate test chambers per test concentration rather than three and;
- 2) Larvae were fed daily.

2.2.3 Reference Toxicant Testing

Reference toxicant testing with copper (II) chloride was performed either concurrent to or within one week of all *Daphnia*, fathead minnow, *Chironomus*, and *Hyalella* range-finding and definitive tests. A concurrent reference toxicant test using potassium dichromate was conducted with the rotifer definitive tests. Reference toxicant testing is a quality



assurance/quality control (QA/QC) procedure performed to confirm the health and toxicant susceptibility of test organisms and demonstrate the use of proper and consistent test conditions and procedures (EPA 1993a). Test concentrations of reference toxicant material varied across species, and were based on past dose responses and lethal concentrations derived in the AMEC Laboratory (Table 5). Due to a lack of an internal reference toxicant database for bluegill, mosquito, and rainbow trout, reference toxicant testing was not conducted with these species.

2.3 STATISTICAL ANALYSES

For acute exposures (including reference toxicants), mean survival in each replicate was transformed into a percentage. Percentage data were arcsine square-root transformed to normalize the distribution of the data prior to statistical analysis. Normality of the data was checked with the Shapiro-Wilks Test. Steel's Many-one Rank Test, the Wilcoxon Rank Sum Test, or Dunnett's Test was used to identify significant differences between concentrations. For *Ceriodaphnia dubia* chronic bioassays, the Kolmogorov-Smirnov test was used to check the normality of the data. Survival data for *Ceriodaphnia* were evaluated with Fisher's exact P test, while the reproduction data were evaluated with either Steel's Many-one Rank Test, or the Wilcoxon Rank Sum Test. For the *Chironomus tentans* chronic exposure, normality of the data was checked using the Shapiro-Wilks test. Survival data were evaluated using Steel's Many-one Rank Test and differences in growth data were evaluated using Student's t-tests. Survival and net production/intrinsic population increase were evaluated for the *Brachionus* acute and chronic tests, respectively. The rate of intrinsic population increase (r) from the chronic rotifer data was calculated using the equation:

$$r = \ln N_t - \ln N_o / T$$

where N_t is the number of rotifers after 2 days, N_0 is the initial number of rotifers, and T is the time of exposure (i.e. 2 days). Normality of data was checked using Shapiro-Wilk's Test prior to analyzing for variance using Bartlett's Test and comparing concentration response using Dunnett's test or Bonferroni t test. When no survivors were present in a concentration, the natural logarithm of the number of rotifers could not be calculated and used to determine EC_{50} values. In this case, net rotifer production was used following the same statistical steps outlined above.

 LC_{50} values were calculated for all range-finding, definitive, and reference toxicant test sets that exhibited a dose-response curve. These endpoints were calculated with Probit, Trimmed Spearman-Karber, or Linear Interpolation methods using ToxCalc Comprehensive Toxicity Data Analysis and Database Software, Version 5.0. The choice of statistical method was dependent upon specific model assumptions met or not met by the data as addressed in EPA (1993a).



3.0 DATA SUMMARIES

Test results are summarized in Table 6. Survival and LC_{50}/EC_{50} summaries, rangefinder water quality data and statistics, definitive water quality data and statistics, and reference toxicant data are contained in Appendices A, B, C, and D, respectively. Chain-of-custody information is located in Appendix E.

Control criteria were met or exceeded for all tests conducted with the exception of the *Chironomus* range-finding tests with m-BDSA, BSA, and resorcinol. Controls for these tests were below the acceptability criterion of 70 percent survival. In this case, the control conducted with the concurrent p-PSA test was substituted for comparison purposes and reflects the same batch of animals and conditions.

All reference toxicant tests met control survival criteria. The LC_{50} value calculated for all tests fell within internal control chart limits of \pm two standard deviations (Appendix D). This indicates that test organism sensitivity during this series of tests was similar to that of organisms historically tested at AMEC.

3.1 RANGE-FINDING TESTS

Two species, *Chironomus* and *Brachionus*, exhibited a significant response during the range-finding studies. Survival of *Chironomus* was zero percent in the highest concentration of resorcinol tested with an LC_{50} of 86.7 mg/L. Survival of *Brachionus* was seven percent in the highest concentration of m-BDSA tested and 53 percent in the second highest tested. The calculated LC_{50} for m-BDSA was 5190 mg/L. Although the calculated LC_{50} for *Brachionus* in BSA was >10,000, it did exhibit a slight dose response to BSA with 53 percent survival in the highest concentration tested. No significant response was exhibited by any other species for any chemical tested during this phase.

3.2 DEFINITIVE TESTS

Three organisms, *Ceriodaphnia, Chironomus*, and *Brachionus* exhibited a dose response to the chemicals tested during the definitive assays. No significant response was exhibited by any other species for the chemicals tested during this phase.

The daphnids demonstrated both an acute and chronic response to the three chemicals tested. Mean survival of daphnids in the acute exposures was 10, 0, and 10 percent in the highest concentration tested (10,000 mg/L) for m-BDSA, BSA, and p-PSA, respectively (see Appendix Tables A-5, A-6, and A-7). Acute 48-hr LC₅₀ values of 6880, 4980, and 7500 mg/L were calculated for m-BDSA, BSA, and p-PSA, respectively. LC₅₀ values for the chronic tests were 3470, 5240, and 5280 mg/L for m-BDSA, BSA, and p-PSA, respectively. EC₅₀ values for the reproductive endpoint were 3440, 3080, and 1030 mg/L for m-BDSA, BSA, and p-PSA, respectively. It should be noted that *C. dubia* is known to be sensitive to waters with high conductivity. Recent experience in the AMEC laboratory, including a recent experiment specifically addressing this issue, suggests that levels above approximately 2000 mhos-cm can



impair survival and reproduction of *C. dubia*. Conductivities in the highest concentrations tested for m-BDSA, BSA, and p-PSA were well above levels expected to cause effects (approx. 5800, 4100, and 3100 mhos-cm, respectively).

Chironomus demonstrated both an acute and chronic response to one chemical, resorcinol. LC_{50} values of 147 and 118 mg/L were obtained for acute and chronic exposures (see Appendix Table A-8). Due to the relatively low survival in the chronic exposure, an EC_{50} value of >100 mg/L was calculated for the growth endpoint, so survival information should drive the use of this assay as a decision-making tool.

Brachionus demonstrated both an acute and chronic response to the three chemicals tested. Mean survival of rotifers in the acute exposures was zero percent in the highest concentration tested (10,000 mg/L) for all chemicals (see Appendix Tables A-5, A-6, and A-7). Acute 24-hr LC $_{50}$ values of 6598, 6950, and 10175 mg/L were calculated for m-BDSA, BSA, and p-PSA, respectively. Net 48-hour organism production for the chronic tests was 0.6, 0, and 0 organisms for the highest concentrations of m-BDSA, BSA, and p-PSA, respectively. EC $_{50}$ values for this endpoint were 7436, 6439, and 7873 mg/L for m-BDSA, BSA, and p-PSA, respectively. EC $_{50}$ values for the intrinsic population increase endpoint were 8907, >5000, and 9869 mg/L for m-BDSA, BSA, and p-PSA, respectively.

These results have been used to calculate genus mean acute values that are presented in Table 7 along with the corresponding data requirements from Stephan et al. (1985). Thus, for example, an acute LC_{50} of 0.147 mg/L for the midge (*Chironomus tentans*) was developed for resorcinol specifically to complete the last data requirement that was not satisfied by literature values obtained from ECOTOX (Table 7). In addition, a chronic toxicity test was also performed to develop chronic values (Table 7) to calculate an ACR for resorcinol because suitable chronic toxicity test information was not found in ECOTOX.



4.0 RESULTS AND DISCUSSION

To derive an AWQC, acceptable aquatic toxicity tests results should be available to satisfy each of the eight requirements presented in Table 1. Review of the available literature in the USEPA ECOTOX database indicated that toxicity test data for resorcinol were available for twelve separate genera. Of these data, seven genera were applicable to satisfying the eight data requirements (Table 2). An acute LC₅₀ of 0.147 mg/L for the midge (*Chironomus tentans*) was subsequently developed specifically to complete the last data requirement that was not satisfied by the literature values obtained from the ECOTOX database (Table 7). In addition, a chronic toxicity test was also performed to develop chronic values (Table 7) that were needed to calculate an ACR for resorcinol because suitable chronic toxicity test information was not found in ECOTOX.

No useable data were found in ECOTOX for m-BDSA. One value was found for BSA (Table 3); however, the exposure time period for Daphnia magna was longer than the USEPA guidelines (Stephan et al., 1985). Ten ECOTOX records were found for p-PSA and two of the LC₅₀s initially appeared valid based on test organism and duration requirements (Stephan et al., 1985). One was a 48-hr LC₅₀ for *Daphnia magna* and the second was a 96-hr LC₅₀ for *Lymnaea* sp (pond snail). Both of these LC₅₀s were published in a 1965 article (Dowden and Bennett, 1965). Because these tests were conducted over 40 years ago and USEPA has specific aquatic toxicity test requirements for toxicity test results to be usable, the papers were reviewed Dowden and Bennett (1965) did not present details of the experimental methods for the daphnia magna tests. The authors cite a 1948 grey literature source that could not be obtained for review. Consequently, it was not possible to verify that USEPA guidelines or ASTM Standard Bioassay Testing protocols were adhered to. Upon review of cross-referenced articles cited in Dowden and Bennett (1965) for general methodologies, it was determined that enough uncertainty exists in the testing procedures to warrant exclusion of the Dowden and Bennett (1965) toxicity test results from the AWQC derivation. Specifically, it was not possible to confirm that neonatal daphnids were used in the test and that the daphnids were not fed during the test, as required by USEPA guidelines (Stephan et al., 1985). In fact, it does appear that the daphnids were fed based on review of the cross-referenced articles. Detailed review of Dowden and Bennett (1965) reveals that the exact species of pond snail tested was not identified and minimal specific information is provided on the test protocols. In addition, reference water was obtained from a university lake for both the daphnid and snail tests where current protocols require laboratory derived water. Because of these factors, the results from the Dowden and Bennett (1965) daphnia toxicity tests are not used in AWQC derivation.

Acute and chronic toxicity tests were conducted on eight test organisms specifically for developing an FAV for these three compounds. Both the preliminary and definitive acute aquatic toxicity tests indicated that, for most test organisms, acute toxicity was not observed at the highest concentrations of m-BDSA, BSA, and p-PSA tested (>10,000 mg/L). For these test organisms and compounds, the highest value tested was conservatively assumed to represent the LC $_{50}$ for calculating acute and chronic criteria. Acute LC $_{50}$ values were developed from the Ceriodaphnia dubia tests for m-BDSA (6,884 mg/L), BSA (4,984 mg/L), and p-PSA (7,497 mg/L). Table 7 presents the results for the acute and chronic toxicity tests performed with these compounds.



Because both acute and chronic toxicity tests were performed for three species, ACRs were calculated for m-BDSA, BSA, p-PSA, and resorcinol (Table 8). The ACRs ranged from less than one to 7.3, and all are much less than the default value of 18 assumed by USEPA (1995). Table 8 also presents the compound-specific ACRs that were developed for these compounds based upon the acute and chronic toxicity test results and the USEPA (1995) protocol.

The values presented in Tables 2, 7, and 8 were used with the procedures described by Stephan *et al.* (1985) to calculate FAVs, CMCs and CCCs for m-BDSA, BSA, p-PSA, and resorcinol (Table 9). Final CMCs (acute AWQC) and CCCs (chronic AWQC) for m-BDSA, BSA, p-PSA, and resorcinol are summarized below:

Compound	CMC (mg/L)	CCC (mg/L)
benzene metadisulfonic acid (m-BDSA)	2,592	1,620
benzene monosulfonic acid (BSA)	1,956	1,151
p-phenol sulfonic acid (p-PSA)	3,482	1,363
Resorcinol	28	7.18

The CMC and CCC values were developed according to established USEPA protocols which, in turn, have been adopted by the Commonwealth of Pennsylvania.



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Table 1 Ambient Water Quality Data Requirements

Acute Freshwater Animal (1)

- a. The family Salmonidae in the class Osteichthyes
- b. One other family (preferably a commercially or recreationally important, warmwater species) in the class Osteichthyes (e.g. bluegill, channel catfish)
- c. A third family in the phylum Chordata (e.g. fish, amphibian)
- d. A planktonic crustacean (e.g. a cladoceran, copepod)
- e. A benthic crustacean (e.g. ostracod, isopod, amphipod, crayfish)
- f. An insect (e.g. mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge)
- g. A family in a phylum other than Arthropod or Chordata (e.g. Rotifera, Annelida, Mollusca)
- h. A family in any order of insect or any phylum not already represented

Freshwater Plant

Results of at least one acceptable test with a freshwater algae or vascular plant is desirable but not required for criterion derivation. If plants are among the aquatic organisms most sensitive to the material, results of a test with a plant in another phylum (division) should also be available

Chronic Freshwater Animals

Acute-Chronic Ratios (ACRs) with at least one species of aquatic animal in at least three different families provided that of the three species (2):

- a. At least one is a fish
- b. At least one is an invertebrate
- c. At least one species is an acutely sensitive freshwater species (the other two may be saltwater species)

Notes:

- (1) Conducting all tests satisfies the requirements for calculating the final acute value.
- (2) If fewer than three acceptable experimentally determined ACRs are available, use enough assumed ACRs of 18 so that the total number of ACRs equals three. Calculate the final ACR as the geometric mean of the three ACRs.

Table 2
Relevant Resorcinol Toxicity Data from USEPA ECOTOX

AWQC Data Requirements	Scientific Name	Common Name	Endpoint	Effect	ct Test E		ECOTOX Ref #	Author (Pub Year)	Doc Code	Conc Me	an	GMAV (ug/L)	GMAV Used in AWQC? (i.e. lowest four)
	Oncorhynchus mykiss	Rainbow trout	EC50	DVP	60	d	2852	Van Leeuwen et al (1990)	С	260,000	ug/L		
	Oncorhynchus mykiss	Rainbow trout	LC50	MOR	60	d	2852	Van Leeuwen et al (1990)	С	320,000	ug/L		
a.	Oncorhynchus mykiss	Rainbow trout	LC50	MOR	96	hr	569	DeGraeve et al (1980)	M	100,000	ug/L	100,000	Yes
The family Salmonidae in the	Oncorhynchus mykiss	Rainbow trout	LOEC	MOR	60	d	2852	Van Leeuwen et al (1990)	С	320,000	ug/L		
class Osteichthyes	Oncorhynchus mykiss	Rainbow trout	LOEC	NOC	60	d	2852	Van Leeuwen et al (1990)	С	320,000	ug/L		
	Oncorhynchus mykiss	Rainbow trout	LOEC	GRO	60	d	2852	Van Leeuwen et al (1990)	С	100,000	ug/L		
	Oncorhynchus mykiss	Rainbow trout	LOEC	GRO	60	d	2852	Van Leeuwen et al (1990)	С	32,000	ug/L		
	Pimephales promelas	Fathead minnow	LC50	MOR	24	hr	5735	Curtis et al (1978)	М	88,600	ug/L		
	Pimephales promelas	Fathead minnow	LC50	MOR	48	hr	5735	Curtis et al (1978)	M	72,600	ug/L		
b. One other family (preferably	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	5735	Curtis et al (1978)	M	56,500	ug/L		
a commercially or	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	5735	Curtis et al (1978)	M	49,500	ug/L		
recreationally important,	Pimephales promelas	Fathead minnow	LC50	MOR	24	hr	875	Curtis et al (1979)	С	88,600	ug/L		
, , ,	Pimephales promelas	Fathead minnow	LC50	MOR	48	hr	875	Curtis et al (1979)	С	72,600	ug/L		
warmwater species) in the	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	875	Curtis et al (1979)	С	53,400	ug/L		
class Osteichthyes (e.g.	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	569	DeGraeve et al (1980)	С	100,000	ug/L		
bluegill, channel catfish)	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	2965	Curtis and Ward (1981)	С	60,000	ug/L		
	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	40,000	ug/L		
	Pimephales promelas	Fathead minnow	LC50	MOR	96	hr	59196	Bergman and Anderson (1977)	M	100,000	ug/L	62,157	Yes
a A third family in the phylyna	Lepidocephalichthyes guntea	Fish	LC50	MOR	24	hr	19085	Sangli et al (1998)	С	80,000	ug/L		
c. A third family in the phylum	Lepidocephalichthyes guntea	Fish	LC50	MOR	48	hr	19085	Sangli et al (1998)	С	77,000	ug/L		
Chordata (e.g. fish,	Lepidocephalichthyes guntea	Fish	LC50	MOR	72	hr	19085	Sangli et al (1998)	С	75,000	ug/L		
amphibian)	Lepidocephalichthyes guntea	Fish	LC50	MOR	96	hr	19085	Sangli et al (1998)	С	73,000	ug/L	73,000	Yes
	Daphnia	Water flea	LD50	MOR	48	hr	58990	Bringmann, G., and R. Kuhn (1960)	M	800,000	ug/L		
d. A planktonic crustacean	Daphnia magna	Water flea	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	250	ug/L		
(e.g. a cladoceran, copepod)	Daphnia pulex	Water flea	LC50	MOR	96	hr	6256	Trabalka, J.R., and M.B. Burch (1978)	M	900	ug/L		
	Daphnia pulicaria	Water flea	LC50	MOR	48	hr	569	DeGraeve et al (1980)	M	100,000	ug/L	282,843	No
e. A benthic crustacean (e.g. ostracod, isopod, amphipod, crayfish)	Gammarus fasciatus	Scud	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	100,000	ug/L	100,000	Yes

Table 2
Relevant Resorcinol Toxicity Data from USEPA ECOTOX

AWQC Data Requirements	Scientific Name	Common Name	Endpoint	Effect	Te: Dura		ECOTOX Ref #	Author (Pub Year)	Doc Code	Conc Mean	GMAV (ug/L)	GMAV Used in AWQC? (i.e. lowest four)
f. An insect (e.g. mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge)												
g. A family in a phylum other than Arthropod or Chordata (e.g. Rotifera, Annelida, Mollusca)	Helisoma trivolvis	Ramshorn snail	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	100,000 ug/L	100,000	No
h. A family in any order of insect or any phylum not already represented.	Dugesia tigrina	Turbellarian, flatworm	LC50	MOR	96	hr	11951	Ewell et al (1986)	O	100,000 ug/L	100,000	No
Additional Aquatic Toxicity T	est Data		•	<u>'</u>			<u> </u>		<u> </u>			
	Danio rerio Danio rerio Danio rerio Danio rerio	Zebra danio Zebra danio Zebra danio Zebra danio	EC50 LC50 LOEC LOEC	DVP MOR MOR NOC	7 7 7 7	d d d	2852 2852 2852 2852	Van Leeuwen et al (1990) Van Leeuwen et al (1990) Van Leeuwen et al (1990) Van Leeuwen et al (1990)	0000	54,800 ug/L 262,000 ug/L 320,000 ug/L 100,000 ug/L		
	Asellus intermedius	Aquatic sowbug	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	100,000 ug/L	100,000	No
	Lumbriculus variegatus	Oligochaete, worm	LC50	MOR	96	hr	11951	Ewell et al (1986)	С	100,000 ug/L	100,000	No
Freshwater Plant Toxicity Te	st Data											
Results of at least one acceptable test with a	Elodea canadensis	Waterweed	EC50	POP	9	d	14483	Stom, D.I., and R. Roth (1981)	М	143,143 ug/L	143,143	
freshwater algae or vascular plant.	Lemna minor	Duckweed	EC50	POP	12	d	14483	Stom, D.I., and R. Roth (1981)	М	165,165 ug/L	165,165	

Notes

- 1. Data listed in this table are freshwater results with a Document Code of "C" or "M" and Endpoint Codes not "NR".
- 2. Abbreviation/codes are as reported in ECOTOX (USEPA, 2006; http://cfpub.epa.gov/ecotox/).
- 3. Highlighted rows indicate data that met the USEPA AWQC Guidelines (Stephan et al., 1985) for calculation of the GMAV and Final Acute Value (FAV).

Table 3
Relevant Sulfonate Toxicity Data from USEPA ECOTOX

Chemical Name	AWQC Data Requirements	Scientific Name	Common Name	Endpoint	Effect			ECOTOX Ref #	Author (Pub Year)	Doc Code	Concentration Mean
Sodium benzenesulfonate (BSA)	d. A planktonic crustacean (e.g. a cladoceran, copepod)	Daphnia magna	Water flea	LC ₅₀	MOR	4.2	d	8066	Freeman (1953)	М	2,840,000 ug/L
4-Hydroxybenzenesulfonic acid, Monosodium salt (p-PSA)	b. One other family (preferably a commercially or recreationally important, warmwater species) in the class Osteichthyes (e.g. bluegill, channel catfish)	Lepomis macrochirus	Bluegill	LC ₅₀	MOR	100	hr	915	Dowden and Bennett (1965)	М	19,616,000 ug/L
	d. A planktonic crustacean (e.g. a cladoceran, copepod)	Daphnia magna	Water flea	LC ₅₀	MOR	4.2	d	8066	Freeman (1953)	М	1,876,000 ug/L
		Daphnia magna Daphnia magna	Water flea Water flea	LC ₅₀	MOR MOR	24 48	hr hr	915 915	Dowden and Bennett (1965) Dowden and Bennett (1965)	M M	13,510,000 ug/L 13,510,000 ug/L
		Daphnia magna Daphnia magna	Water flea Water flea	LC ₅₀ LC ₅₀	MOR MOR	72 96	hr hr	915 915	Dowden and Bennett (1965) Dowden and Bennett (1965)	M M	3,494,000 ug/L 1,471,000 ug/L
	g. A family in a phylum other than Arthropod or Chordata (e.g. Rotifera,	Lymnaea sp.	Pond snail Pond snail	LC ₅₀ LC ₅₀ LC ₅₀	MOR MOR MOR	24 48	hr hr	915 915	Dowden and Bennett (1965) Dowden and Bennett (1965)	M M	10,700,000 ug/L 9,122,000 ug/L
	Annelida, Mollusca)	Lymnaea sp. Lymnaea sp.	Pond snail Pond snail	LC ₅₀ **	MOR	72 96	hr hr	915 915	Dowden and Bennett (1965) Dowden and Bennett (1965)	M M	8,828,000 ug/L 8,828,000 ug/L

Notes:

- 1. Data listed in this table are freshwater results with a Document Code of "C" or "M" and Endpoint Codes not "NR".
- 2. Abbreviation/codes are as reported in ECOTOX (USEPA, 2006; http://cfpub.epa.gov/ecotox/).
- 3. Highlighted rows indicate data that met the USEPA AWQC Guidelines (Stephan et al., 1985) for calculation of the GMAV and Final Acute Value (FAV).
- 4. * -Based on test species and duration requirments, the 48-hr LC50 for *Daphnia magna* appears to meet the USEPA AWQC Guidelines (Stephan et al., 1985) for use in the calculation of GMAV and/or FAV. However, after obtaining the original article which is over 40 years old, AMEC considers this result inappropriate for AWQC derivation based on the following reasons: questionable test organisms (age unclear, required to be less than 24 hours old at test inception), media (lakewater as control water) and feeding regimens (daphnids appear to have been fed, which is not recommended in Stephan et al (1985)). These testing methods would not meet current USEPA or ASTM bioassay protocols for Standard Toxicity Testing if they were condcuted present day. See text for further discussion.
- 5. ** -Based on test species and duration requirments, the 96-hr LC50 for the pond snail appears to meet the USEPA AWQC Guidelines (Stephan et al., 1985) for use in the calculation of GMAV and/or FAV. However, after obtaining the original article which is over 40 years old, AMEC considers this result inappropriate for AWQC derivation based on the following reasons: questionable test organisms of unidentified species and collected from local waterbodies (not laboratory born) and media (lakewater as control water). These testing methods would not meet current USEPA or ASTM bioassay protocols for Standard Toxicity Testing if they were condcuted present day. See text for further discussion.

Table 4
Chemical and Species/Test type Matrix for Range-Finding and Definitive Test Series

Species & Test Type	Chemical Tested							
	m-BDSA	BSA	p-PSA	Resorcinol				
Ceriodaphnia dubia (water flea) Acute Exposure	X	X	Х					
Ceriodaphnia dubia (water flea) Chronic Exposure	X	X	х					
Pimephales promelas (fathead minnow) Acute Exposure	X	X	Х					
Hyalella azteca (amphipod) Acute Exposure	X	X	Х					
Chironomus tentans (midge) Acute Exposure	Х	X	Х	х				
Chironomus tentans (midge) Chronic Exposure (definitive only)	X	X	X	x				
Oncorhynchus mykiss (rainbow trout) Acute Exposure	X	X	Х					
Lepomis macrochirus (bluegill) Acute Exposure	X	X	Х					
Brachionus calyciflorus (rotifer) Acute Exposure	Х	X	Х					
Brachionus calyciflorus (rotifer) Chronic Exposure	X	X	Х					
Culex pipiens (mosquito) Acute Exposure	Х	X	Х					

Table 5
Summary of the Nominal Concentrations Used for Reference
Toxicant Testing - Copper (II) Chloride and Potassium
Dichromate

Species & Test Type	Test Concentrations and Toxicant
Ceriodaphnia dubia -	
Acute Exposure	0, 3.125, 6.25, 12.5, 25, and 50 μg/L Copper
Ceriodaphnia dubia -	
Chronic Exposure	0, 12.5, 25, 50, 100, and 200 μg/L Copper
Pimephales promelas -	
Acute Exposure	0, 15, 30, 60, 120, and 240 μg/L Copper
Hyalella azteca -	
Acute Exposure	0, 100, 200, 400, 800, and 1,600 μg/L Copper
Chironomus tentans -	
Acute Exposure	0, 187.5, 375, 750, 1,500, and 3,000 μg/L Copper
Brachionus calyciflorus - Acute Exposure	0, 2.5, 5.0, 10, 20, and 40 mg/L Potassium Dichromate
Brachionus calyciflorus - Chronic Exposure	0, 1.25, 2.5, 5.0, 10, and 20 mg/L Potassium Dichromate

 $\label{eq:Table 6} \mbox{Summary LC}_{50} \mbox{ and EC}_{50} \mbox{ reported in mg/L}$

Species/Procedure	m-BDSA	BSA	p-PSA	Resorcinol
Range-finding Assays				
Acute Ceriodaphnia	>1,000	>1,000	>1,000	NT
Chronic <i>Ceriodaphnia</i>	·		·	
Survival	>1,000	>1,000	>1,000	NT
Chronic Ceriodaphnia				
Reproduction	>1,000	>1,000	>1,000	NT
Acute <i>Pimephales</i>	>1,000	>1,000	>1,000	NT
Acute <i>Hyalella</i>	>1,000	>1,000	>1,000	NT
Acute Chironomus	>1,000	>1,000	>1,000	86.7
Acute Oncorhynchus	>10,000	>10,000	>10,000	NT
Acute <i>Lepomis</i>	>10,000	>10,000	>10,000	NT
Acute Brachionus	5190	>10,000	>10,000	NT
Acute Culex	NT	NT	NT	NT
Definitive Assays				
Acute <i>Ceriodaphnia</i>	6,884	4,984	7,497	NT
Chronic Ceriodaphnia				
Survival	3,474	5,238	5,278	NT
Chronic Ceriodaphnia				
Reproduction	3,436	3,078	1,027	NT
Acute Pimephales	>10,000	>10,000	>10,000	NT
Acute <i>Hyalella</i>	>10,000	>10,000	>10,000	NT
Acute Chironomus	>10,000	>10,000	>10,000	147
	NT	NT	NT	
Chronic Chironomus Survival				118
	NT	NT	NT	
Chronic Chironomus Growth				>100
Acute Oncorhynchus	>10,000	>10,000	>10,000	NT
Acute <i>Lepomi</i> s	>10,000	>10,000	>10,000	NT
Acute <i>Brachionus</i>	6,598	6,950	10,175	NT
Chronic <i>Brachionus</i> Net				
Production	7,436	6,439	7,873	NT
Chronic <i>Brachionus</i>				
Population Increase	8,907	>5,000	9,869	NT
Acute <i>Culex</i>	>10,000	>10,000	>10,000	NT

Table 7
Acute and Chronic Toxicity Test Results for the Test Compounds

Tier 1 Requirements(1)	Scientific name, Common name	Endpoint	m-BDSA (mg/L)	BSA (mg/L)	p-PSA (mg/L)	Resorcinol (mg/L)
Acute Freshwater Animal						
a. The family Salmonidae in the class Osteichthyes	Oncorhynchus mykiss (rainbow trout)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
b. One other family (preferably a commercially or recreationally important, warmwater species) in the class Osteichthyes (e.g. bluegill, channel catfish)	Lepomis macrochirus (bluegill)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
c. A third family in the phylum Chordata (e.g. fish, amphibian)	Pimephales promelas (fathead minnow)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
d. A planktonic crustacean (e.g. a cladoceran, copepod)	Ceriodaphnia dubia (water flea)	48 hr LC ₅₀	6,884	4,984	7,497	
e. A benthic crustacean (e.g. ostracod, isopod, amphipod, crayfish)	Hyalella azteca (amphipod)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
f. An insect (e.g. mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge)	Culex pipiens (mosquito)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
f. An insect (e.g. mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge)	Chironomus tentans (midge)	96 hr LC ₅₀				147
g. A family in a phylum other than Arthropod or Chordata (e.g. Rotifera, Annelida, Mollusca)	Brachionus calyciflorus (rotifer) (1)	24 hr LC ₅₀	6,598	6,950	10,175	
h. A family in any order of insect or any phylum not already represented	Chironomus tentans (midge larvae)	96 hr LC ₅₀	>10,000	>10,000	>10,000	
Freshwater Plant						
Results of at least one acceptable test with a freshwater algae or vascular plant is desirable but not required for criterion derivation. If plants are among the aquatic organisms most sensitive to the material, results of a test with a plant in another phylum (division) should also be available	Selanstrum capricornutum (algae) (2)	96 hr LC ₅₀	>1,000	>1,000	>1,000	
Chronic Freshwater Animals	•		•	•	•	•
b. At least one is an invertebrate	Ceriodaphnia dubia (water flea) (3)	7 day survival	3,474	5,238	5,278	
	Ceriodaphnia dubia (water flea) (3)	7 day reproduction	3,436	3,078	1,027	
b. At least one is an invertebrate	Chironomus tentans (midge) (4)	7 day survival				117
	Chironomus tentans (midge) (4)	7 day growth				>100
c. At least one species is an acutely sensitive freshwater species (the other two may be saltwater species)	Brachionus calyciflorus (rotifer) (5)	48 hr net production	7,436	6,439	7,873	
	Brachionus calyciflorus (rotifer) (5)	48 hr population increase	8,907	>5,000	9,869	

Notes:

- (1) Toxicity tests for the rotifer were conducted in the AMEC Northwest Bioassay Laboratory. All other tests were conducted in the AMEC San Diego Laboratory (AMEC, 2003).
- (2) Toxicity tests for the algae were conducted in the AMEC San Diego Laboratory (AMEC, 2002).
- (3) The acute-to-chronic ratio for this species was 1.92 for m-BDSA, 1.62 for BSA, and 7.3 for p-PSA.
- (4) The acute-to-chronic ratio for this species was 1.47 for resorcinol.
- (5) The acute-to-chronic ratio for this species was 0.89 for m-BDSA, 1.08 for BSA, and 1.29 for p-PSA.

Table 8
Acute to Chronic Ratio Calculations

	m-BDSA (mg/L)	BSA (mg/L)	p-PSA (mg/L)	Resorcinol (mg/L)
Ceriodaphnia dubia (water flea)	1.92	1.62	7.30	
Brachionus calyciflorus (rotifer)	0.89	1.08	1.29	
Chironomus tentans (midge)				1.47
Final ACR (1)	3.2	3.4	5.10	7.81

Notes:

(1) If fewer than three acceptable experimentally determined ACRs are available, use enough assumed ACRs of 18 so that the total number of ACRs equals three.

Table 9
Ambient Water Quality Criteria Calculations

	m-BDSA (mg/L)	BSA (mg/L)	p-PSA (mg/L)	Resorcinol (mg/L)
Final Acute Value (FAV)	5,185	3,912	6,951	56
Criterion Maximum Concentration (CMC)	2,592	1,956	3,476	28
Final Acute to Chronic Ratio	3	3	5	8
Criterion Continuous Concentration (CCC)	1,620	1,151	1,363	7.18

Attachment 1 - Table A Chronic Toxicity Test Results for Resorcinol using *Daphnia* and *Pseudokirchneriella* spp. (Resorcinol Task Force 2004/2006 Studies)

Scientific Name	Common Name	Type of Test	Endpoint	Effect Concentration (ug/L)
Daphnia magna	Water Flea	Survival	21-day NOEC	172
Daphnia magna	Water Flea	Survival	21-day LOEC	> 172
Daphnia magna	Water Flea	Survival	21-day EC ₅₀	> 172
Daphnia magna	Water Flea	Growth / Reproduction (# offspring released)	21-day NOEC	172
Daphnia magna	Water Flea	Growth / Reproduction (# offspring released)	21-day EC ₅₀	> 172
Pseudokirchneriella subcapitata	Green Algae	Cell Biomass	72-hr NOEC	47
Pseudokirchneriella subcapitata	Green Algae	Cell Biomass	72-hr EC ₅₀	> 97
Pseudokirchneriella subcapitata	Green Algae	Growth Rate	72-hr NOEC	97
Pseudokirchneriella subcapitata	Green Algae	Growth Rate	72-hr EC ₅₀	> 97

Notes:

- 1. Results are summarized from Springborn Laboratories (2004) and Springborn Smithers Laboratories (2006). This work was published by the Resorcinol Task Force (RTF).
- 2. None of the above concentrations were required for the calculation of GMAVs or FAVs for resorcinol for the following reasons. The RTF study exposure concentrations were set well below values used from either the USEPA ECOTOX database or those assayed for this report and none of the concentrations showed a significant dose-response related adverse effect on any of the test organisms. That is, most effect concentrations are unbounded NOECs in that the true NOECs may exist at much higher concentrations that were tested. See text for further discussion.

Appendix A

Bioassay Survival and LC50/EC50 Summaries

Range-finding Study

Benzene Metadisulfonic Acid (BMDSA)

Appendix Table A-1. Survival, Reproduction (Ceriodaphnia dubia), and LC50 Summary

Benzene Metadisulfonic Acid (BMDSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Меал Number of Neonates ^b	LCso/ECso %Effluent*
	Lab Control	86.7	NA	
	0.1	93.3	NA	
Ceriodaphnia dubia -	1	100	NA	
Acute Exposure	10	80	NA	
	100	80	NA	>1000
	1,000	93.3	NA	
	Lab Control	80	14	
	0.1	100	20	
Ceriodaphnia dubia -	1	100	13	
Chronic Exposure	10	90	17	
	100	100	16	>1000 (survival)
	1,000	80	21	>1000 (repro)
	Lab Control	100	NA	
	0.1	100	NA	
Pimephales promelas -	1	100	NA	
Acute Exposure	10	100	NA	
	100	100	NA.	>1000
	1,000	100	NA NA	7 1000
	Lab Control	93.3	NA	
	0.1	93.3	NA NA	
Hyaleila azteca -	1	100	NA NA	
Acute Exposure	10	93.3	NA NA	
Addio Exposuro	100	100	NA NA	10000000000000000000000000000000000000
	1,000	90		>1000
	Lab Control		NA NA	
	0.1	70°	NA NA	
•••		73	NA	
Chironomus tentans - Acute Exposure	1	46.7	NA 	
Addio Exposuro	10	50	NA 	
	100	63,3	NA	>1000
	1,000	63.3	NA	(44444444444444444444444444444444444444
	Lab Control	100	NA	
	10	100	NA .	
Oncorhynchus mykiss -	100	100	NA ´	
Acute Exposure	500	100	NA	
	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA NA	
	Lab Control	100	NA	
	10	100	NA	
l anomic macrochime -	100	100	NA	
Lepomis macrochirus - Acute Exposure	500	100	NA	
•	1,000	100	NA	
	5,000	100	NA	>10,000
<u></u>	10,000	100	NA	
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Brachlonus calyciflorus - Acute Exposure	500	100	NA	
vegre tyhodara	1,000	100	NA	
	5,000	53*	NA.	5190
	10,000	7*	NA NA	

^{95%} confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

b Vaues are for Ceriodaphnia dubia chronic exposures only.

Control data were obtained from the PSA bioassay. Control performance for other three tests was below test acceptability criteria.

* Statistically different from control (p < 0.05)

NA = Not Applicable

Benzene Monosulfonic Acid (BMSA)

Appendix Table A-2. Survival, Reproduction (Ceriodaphnia dubia), and LC50 Summary

Benzene Monosulfonic Acid (BMSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b	LCso/ECso %Effluent*
	Leb Control	86.7	NA	
	0.1	100	NA	
Ceriodaphnia dubia - Acute Exposure	1	93.3	NA	
	10	100	NA	
	100	100	NA	>1000
	1,000	80	NA	
_	Lab Control	100	29	
	0.1	80	23	
Ceriodaphnia dubia -	1	80	21	
Chronic Exposure	10	100	22	
	100	100	23	>1000 (survival)
	1,000	100	23	>1000 (repro)
<u> </u>	Lab Control	100	NA NA	- 1000 (16p/0)
	0,1	100	NA NA	
Pimephales promelas -	1	100	NA.	
Acute Exposure	10	100	NA.	
•	100	100		
			NA NA	>1000
	1,000	100	<u>NA</u>	
	Lab Control	93.3	NA	
	0.1	. 96.7	NA	
Hyalelia azteca -	1	100	NA	
Acute Exposure	10	90	NA	
	100	96.7	NA	>1000
	1,000	93.3	NA_	
	Lab Control	70°	NA	
	0.1	46.7	NA	
Chironomus tentans -	1	50	NA	
Acute Exposure	10	63.3	NA	
	100	60	NA	>1000
	1,000	53.3	NA	
	Lab Control	100	NA.	
	10	100	NA	
	100	100	NA	
Oncorhynchus mykiss - Acute Exposure	500	100	NA	
Acate Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA.	,
	Lab Control	100	NA NA	
	10	100	NA	
	100	100	NA NA	
Lepomis macrochirus -	500	100		
Acute Exposure	1,000	100	NA NA	
			NA NA	
	5,000	100	NA NA	>10,000
	10,000	100	<u>NA</u>	
	Lab Control	100	NA 	
	10	100	NA	
Brachionus calyciflorus -	100	100	NA	
Acute Exposure	500	100	NA	
•	1,000	100	NA	
	5,000	93	NA	>10,000
	10,000	53*	NA	•

^{95%} confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

b Vaues are for Ceriodaphnia dubia chronic exposures only.

Control data were obtained from the PSA bioassay. Control performance for other three tests was below test acceptability. criteria,
* Statistically different from control (p < 0.05)

NA = Not Applicable

p-Phenol Sulfonic Acid (PSA)

Appendix Table A-3. Survival, Reproduction (Ceriodaphnia dubia), and LC50 Summary

p-Phenol Sulfonic Acid (PSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b	LCs:/ECs: %Effluent*
	Lab Control	93.3	NA	
	0.1	100	NA	
Ceriodaphnia dubia -	1	100	NA	
Acute Exposure	10	100	NA	
	100	73.3	NA	>1000
	1,000	86.7	NA	
	Lab Control	100	20	
	0.1	80	19	
Ceriodaphnia dubia -	1	60	18	
Chronic Exposure	10	80	22	
	100	100	24	>1000 (survival)
	1,000	100	14	>1000 (repro)
	Lab Control	100	NA	
	0.1	90	NA	
Pimephales promelas -	1	100	NA	
Acute Exposure	10	100	NA	
	100	100	NA	>1000
	1,000	100	NA	
·	Lab Control	96.7	NA	
	0.1	100	NA	
Hyalella azteca -	1	100	NA	
Acute Exposure	10	96.7	NA	
	100	96.7	NA	>1000
	1,000	96.7	NA	
	Lab Control	70	NA NA	
	0.1	53,3	NA	
Chironomus tentans -	1	26.7	NA	
Acute Exposure	10	50	NA	
	100	43,3	NA	>1000
	1,000	46.7	NA	
	Lab Control	100	NA NA	
	10	100	NA	
	100	100	NA	
Oncorhynchus mykiss - Acute Exposure	500	100	NA	
Acate Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	•
	Lab Control	100	NA NA	
	10	100	NA	
	100	100	NA.	
Lepomis macrochirus - Acute Exposure	500	100	NA	
Vente Exhoanta	1,000	100	NA.	
	5,000	100	NA.	>10,000
	10,000	100	NA.	
	Lab Control	100	NA NA	
	10	100	NA	
	100	100	·NA	
Brachionus calyciflorus -	500	100	NA.	
Acute Exposure	1,000	100	NA NA	
	5,000	100	NA.	>10,000
	10,000	87*	NA NA	- 10,000

^{* 95%} confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

bVaues are for *Ceriodaphnia dubia* chronic exposures only.

• Statistically different from control (p < 0.05)

Resorcinol (RES)

Appendix Table A-4. Survival, Growth, and LC50 Summary Resorcinol (RES)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	LC50 %Effluent ^a
	Lab Control ^b	70	
	0.1	63.3	
Chironomus tentans -	1	73.3	
Acute Exposure	10	56.7	
	100	43.3	86.7 (49.8-151)
	1,000	Ò.	

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

^b Control data were obtained from the PSA bioassay. Control performance for other three tests was below test acceptability criteria.

^{*} Statistically different from control (p < 0.05)

Definitive Study

Benzene Metadisulfonic Acid (BMDSA)

Appendix Table A-5. Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary

Benzene Metadisulfonic Acid (BMDSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LCso/ECso/ICso %Effluent ^a
	Lab Control	100	NA	
	500	100	NA	
	1,000	100	NA	
Ceriodaphnia dubia - Acute Exposure	2,000	100	NA	
Notes Exposure	4,000	95	NA	
	8,000	35*	NA	6880 (5810-7840)
	10,000	10*	NA	,
	Lab Control	90	- 35	
	500	100	39	
	1,000	100	38	
Ceriodaphnia dubia -	2,000	56	32	
Chronic Exposure	4,000	70	12*	
	8,000	0*	0*	3470 (2010-4790) sur
	10,000	0*	0*	3440 (3060-3760) repi
- · · · · · · · · · · · · · · · · · · ·	Lab Control	97.5	NA NA	
	500	100	NA	
	1,000	95	NA	
Pimephales promelas -	2,000	97.5	NA	
Acute Exposure	4,000	100	NΑ	
	8,000	97.5	NA	>10,000
	10,000	100	NA.	10,000
	Lab Control	98	NA NA	
	500	96	NA.	
	1,000	100	NA.	
Hyalella azteca -	2,000	100	NA.	
Acute Exposure	4,000	100	NA.	
	8,000	98	NA.	>10,000
	10,000	92	NA.	,0,000
	Lab Control	80	NA.	
	500	78	NA.	
	1,000	86	NA.	
Chironomus tentans -	2,000	94	NA.	
Acute Exposure	4,000	90	NA NA	
	8,000	86	NA.	>10,000
	10,000	84	NA NA	- 10,000

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

NA = Not Applicable

^b Vaues are for *Ceriodaphnia dubia* chronic exposures only.

^c Values are for *Brachionus calyciflorus* chronic exposures only

^{*} Statistically different from control (p < 0.05)

Appendix Table A-5 (cont.). Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary

Benzene Metadisulfonic Acid (BMDSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LCso/ECso/ICso %Effluent ^a
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Oncorhynchus mykiss - Acute Exposure	500	100	NA	
Addit Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Lepomis macrochirus - Acute Exposure	500	100	NA	
Acute Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	· 100	NA	
	Lab Control	96	NA	
	10	92	NA	
	100	96	NA	
Culex pipiens - Acute Exposure	500	96	NA	
Acute Exposure	1,000	96	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	
	Lab Control	100	NA NA	
	625	100	NA	
Brachionus calyciflorus -	1,250	100	NA	
Acute Exposure	2,500	100	NA	
	5,000	90	NA	6598
	10,000	0*	NA	
· - · · · · · · · · · · · · · · · · · · ·	Lab Control	NA	4.7 (0.87) ^d	
	625	NA	6.1 (0.98) ^d	
Brachionus calyciflorus -	1,250	NA	4.0 (0.85) ^d	
Chronic Exposure	2,500	NA	4.8 (0.85) ^d	
	5,000	NA	5.4 (0.92) ^d	7436 (6855-8078) prod
	10,000	NA	0.6* (0.35*) ^d	8907 r value

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

NA = Not Applicable

^b Vaues are for *Ceriodaphnia dubia* chronic exposures only.

^c Values are for *Brachionus calyciflorus* chronic exposures only

^d Number in parenthesis is the r-value

^{*} Statistically different from control (p < 0.05)

Benzene Monosulfonic Acid (BMSA)

Appendix Table A-6. Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary

Benzene Monosulfonic Acid (BMSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LC50/EC50/IC50 %Effluent ^a
	Lab Control	100	NA	
	500	95	NA	
	1,000	100	NA	
Ceriodaphnia dubia - Acute Exposure	2,000	100	NA	
Acute Exposure	4,000	100	NA	
	8,000	5 *	NA	4980
	10,000	0*	NA	
	Lab Control	100	38	
	500	100	37	
	1,000	100	34	
Ceriodaphnia dubia - Chronic Exposure	2,000	100	31*	
Omonic Exposure	4,000	89	12*	
	8,000	0*	0*	5240 (4530-6060) sui
	10,000	0*	0*	3080 (2710-3500) rep
	Lab Control	97.5	NA	
	500	100	NA	
	1,000	100	NA	
Pimephales promelas - Acute Exposure	2,000	97.5	NA	
Acute Exposure	4,000	100	NA	
	8,000	97.5	NA	>10,000
	10,000	97.5	NA	
	Lab Control	98	NA	
	500	100	NA	
	1,000	100	NA	
<i>Hyalella azteca -</i> Acute Exposure	2,000	100	NA	
Acute Exposure	4,000	96	NA	
	8,000	98	NA	>10,000
	10,000	82	NA	
	Lab Control	80	NA	
	500	84	NA	
	1,000	86	NA	
Chironomus tentans - Acute Exposure	2,000	82	NA	
Acute Exposure	4,000	90	NA	
	8,000	90	NA	>10,000
	10,000	84	NA	

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

^b Vaues are for *Ceriodaphnia dubia* chronic exposures only.

^cValues are for *Brachionus calyciflorus* chronic exposures only

^{*} Statistically different from control (p < 0.05)

Appendix Table A-6 (cont.). Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary

Benzene Monosulfonic Acid (BMSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LCso/ECso/ICso %Effluent ^a
	Lab Control	100	NA NA	
	10	100	NA	
	100	100	NA	
Oncorhynchus mykiss - Acute Exposure	500	100	NA	
Acute Exposure	1,000	90	NA	
	5,000	75°	NA	>10,000
	10,000	100	NA	
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Lepomis macrochirus -	500	100	NA	
Acute Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	·
	Lab Control	100	NA NA	
	10	92	NA	
	100	100	NA	
Culex pipiens -	500	100	NA	
Acute Exposure	1,000	92	NA	
	5,000	88	NA	>10,000
•	10,000	92	NA	·
·	Lab Control	100	NA NA	
	625	100	NA	
Brachionus calyciflorus -	1,250	100	NA	
Acute Exposure	2,500	98	NA	
	5,000	100	NA	6950
	10,000	0*	NA.	
	Lab Control	NA	5.9 (0.95) ^d	
	625	NA .	4.8 (0.87) ^d	
Brachionus calyciflorus -	1,250	NA	4.9 (0.86) ^d	
Chronic Exposure	2,500	NA.	4.5 (0.90) ^d	
•	5,000	NA NA	4.1 (0.81*) ^d	6439 (5416-7059) prod
	10,000	NA NA	0* ^f	>5,000 r value

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

NA = Not Applicable

^bVaues are for Ceriodaphnia dubia chronic exposures only.

^cValues are for *Brachionus calyciflorus* chronic exposures only

^d Number in parenthesis is the r-value

One replicate had zero percent survival, remaining three had 100% survival

fr value incalculable due to 100% mortality

^{*} Statistically different from control (p < 0.05)

p-Phenoi Sulfonic Acid (PSA)

Appendix Table A-7. Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary

p-Phenol Sulfonic Acid (PSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LCso/ECso/ICso %Effluent ^a
	Lab Control	100	NA	
	500	95	NA	
Australia di Articolo de La	1,000	100	NA	
Ceriodaphnia dubia - Acute Exposure	2,000	95	NA	
	4,000	95	NA	
	8,000	60*	NA	7500
	10,000	10*	NA	
-	Lab Control	100	37	
	500	100	37	
0.54.1.1.11	1,000	100	20*	
Ceriodaphnia dubia - Chronic Exposure	2,000	100	0*	
omomo Exposaro	4,000	90	0*	
	8,000	0*	0*	5280 (4630-6020) surv
	10,000	0*	0*	1030 repro
	Lab Control	95	NA	
	500	97.5	NA	
	1,000	100	NA	
Pimephales promelas - Acute Exposure	2,000	97.5	NA	
Alouto Exposuro	4,000	97.5	NA	
	8,000	92.5	NA	>10,000
	10,000	92.5	NA	
	Lab Control	98	NA	
	500	96	NA	
	1,000	98	NA	
Hyalella azteca - Acute Exposure	2,000	98	NA	
	4,000	98	NA	
	8,000	94	NA	>10,000
	10,000	64	NA	
	Lab Control	80	NA	
	500	94	NA	
Obtain	1,000	86	NA	
Chironomus tentans - Acute Exposure	2,000	72	NA	
AVAIN EXPOSUIE	4,000	72	NA	
	8,000	82	NA	>10,000
	10,000	82	NA	

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

NA = Not Applicable

^bVaues are for *Ceriodaphnia dubia* chronic exposures only.

^cValues are for *Brachionus calyciflorus* chronic exposures only

^{*} Statistically different from control (p < 0.05)

Appendix Table A-7 (cont.). Survival, Reproduction (*Ceriodaphnia dubia*), and LC50 Summary p-Phenol Sulfonic Acid (PSA)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Number of Neonates ^b / Organisms ^c	LC50/EC50/IC50 %Effluent ^a
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Oncorhynchus mykiss - Acute Exposure	500	100	NA	
Acute Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	
	Lab Control	100	NA	
	10	100	NA	
	100	100	NA	
Lepomis macrochirus -	500	100	NA	
Acute Exposure	1,000	100	NA	
	5,000	100	NA	>10,000
	10,000	100	NA	70,000
	Lab Control	84	NA	
	10	80	NA	
	100	100	NA	
Culex pipiens -	500	92	NA	
Acute Exposure	1,000	92	NA	
	5,000	96	NA	>10,000
	10,000	100	NA	,5,655
- 	Lab Control	100	NA	
	1,250	100	NA	
Brachionus calyciflorus -	2,500	100	NA.	
Acute Exposure	5,000	100	NA.	
	10,000	53*	NA NA	10,175
	20,000	0*	NA	10,110
	Lab Control	84	4.0 (0.78) ^d	
	1,250	80	4.4 (0.77) ^d	
Brachionus calyciflorus -	2,500	100	5.2 (0.93) ^d	
Chronic Exposure	5,000	92	5.6 (0.92) ^d	
•	10,000	92	0.6* (0.41) ^d	7873 (7285-8367) prod
	20,000	96	0.6° (0.41) 0*°	9869 r value

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

NA = Not Applicable

^bVaues are for Ceriodaphnia dubia chronic exposures only.

^c Values are for *Brachionus calyciflorus* chronic exposures only

^d Number in parenthesis is the r-value

⁶ r value incalculable due to 100% mortality

^{*} Statistically different from control (p < 0.05)

Resorcinol (RES)

Appendix Table A-8. Survival, Growth, and LC50 Summary Resorcinol (RES)

Species & Test Type	Concentration (mg/L)	Mean Percent Survival	Mean Growth per Organism ^b (mg)	LCso/ECso %Effluent ^a
	Lab Control	80	NA	
	100	66	NA	
	250	8*	NA	
Chironomus tentans - Acute Exposure	500	0*	NA	
Addio Exposuro	750	0*	NA	
	1,000	0*	NA	147 (111-178)
	2,000	0*	NA	
··-··	Lab Control	72	0.178	
	100	44	0.162	
	250	0*	0*	
Chironomus tentans - Chronic Exposure	500	0*	0*	
Omomo Exposure	750	0*	0*	
	1,000	0*	0*	118 (69-202) surv
	2,000	0*	0*	>100 growth

^a 95% confidence intervals for LC50 values are displayed in parentheses when calculation was possible.

^b Values are for *C. tentans* chronic exposure only.
* Statistically different from control (p < 0.05)

Appendix B Bioassay Water Quality, Survival, and Statistical Summaries Range-finding Study

Ceriodaphnia dubia
Acute Exposure

Freshwater Acute

48 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Blanes	Start Date & Time: 1127/02 14:30
Sample ID: BMD5A	End Date & Time: 11/29/62 1340
Contact:	Test Organism: <u>Caubia</u>
Test #: 10211-335	Test Protocol: EPA WET 1994, EPA OPPTS 199

Concentration		N	umber	of	Disso	lved O	xygen		pН		Co	nductiv	ity	Te	mperat	ture	
Mg/L	Rep	Live	Organ	isms		(mg/L)	• •	(p	H unit	s)	(µı	nhos-c	m)		(°C)		Percent
- 1113(12	, cop	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48	Survival
Lab Control	A	5	5	u	8.0	-	8-5	805	-	8,19	182)	189	24.7	263	246	80
LEW CUTATOI	B	5	4	4					2								80
	C	5		5													100
	A	5	-	И	7.9	ADMINISTRAÇÃO .	X	8,03		819	179	<u>ب</u> ے	190	247	2453	24.4	80
0.1	B	5	سے۔	1	30.00												3
	C	5	5	5	STATE OF THE PERSON										1		100
			-2-	5	7.9	TO A STATE OF THE PARTY OF THE		8.02	1016-011310-	W 22	180	(ANUMENT)	188	247	24.3	24.6	
1.0	A	5	3	- >-	第888 第	5		10.02									100
	B_	<u> </u>	<u> </u>	<u> </u>				2000	STATE OF THE PARTY.						68		100
	C	5	<u>\$</u> .	<u> </u>		NAME OF THE PROPERTY OF THE PR	対路線は	8.03		D 17	184	\$55.00m	797	241	243	24.6	
10	A	5	5	3	7.8	~ ≅/69/33	<u></u> σ·ν	0.00	6 (5-3)	0,67	1107						100
	B	5_	<u> </u>	سع						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	李38300		14.00				80
	C	5_		4					3500	0 1 U	0.70	3.213			261	245	
100	Α	<u> 5</u> _	5	5	7.8	herskilder (av	8.5	808	रस्यात्रक्षकार्याः	8.29	238	(9)20/20/6	210	24.1			100
	В	5	5	2							1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				2 12		
	С	5	5	5			500	2000				S. S. M.		100	沙城市		100
1000	Α	5	5	5	8.0	ہے ا	8.6	8.15	1	8.75	1741	<u>स्वयंत्रम्</u>	581	24.1	ピチン	24.6	1 -
	В	5	3	5													100
	С	5	4	4					经验				NAME	機構	1886		80
Technician Init	ials	All	Be	52													

Animal Source:	Internal	Date Received: <u>UA</u>	
Comments:	0 hrs: <u>range finder</u> 24 hrs: 48 hrs:	test, fed prior to initiation	AMEC Earth and Environmenta 5550 Morehouse Dr., Suite B
OA Check:	Bu 12/02/02	Final Review: A VHB	San Diego, CA 92121 (858) 458-9044

				Daphnia Acute Survival Bioa	assay-48 Hr Surv	ival
Start Date:	11/27/2002		Test ID:	0211-335	Sample ID:	BEAZER
End Date:	11/29/2002	<u> </u>	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	BMDSA - Benzene Metadisulfonic Acid
Sample Date:			Protocol:	EPAA 93-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial p	product	testing		-	·
Conc-mg/L	1	2	3			
L-Lab Control	0.8000	0.8000	1.0000		, · · ,	, <u>, , , , , , , , , , , , , , , , , , </u>
0.1	0.8000	1.0000	1.0000	l		S.
1	1.0000	1.0000	1.0000	1		
10	0.6000	1.0000	0.8000	1		
100	1.0000	0.4000	1.0000	l		·
1000	1.0000	1.0000	0.8000	•		<u>.</u>

		_	Tra	nsform: /	Arcsin Sc	uare Roof	ì	_	1-Tailed		Isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.8667	1.0000	1.1865	1.1071	1.3453	11.587	3				0.9333	1.0000
0.1	0.9333	1.0769	1.2659	1.1071	1.3453	10.861	3	-0.472	2.500	0.4207	0.9333	1.0000
1	1.0000	1.1538	1.3453	1.3453	1.3453	0.000	3	-0.943	2.500	0.4207	0.9333	1.0000
10	0.8000	0.9231	1.1128	0.8861	1.3453	20.637	3	0.438	2.500	0.4207	0.8444	0.9048
100	0.8000	0.9231	1.1251	0.6847	1.3453	33.897	. 3	0.365	2.500	0.4207	0.8444	0.9048
<i>4</i> 1000	0.9333	1.0769	1.2659	1.1071	1.3453	10.861	3	-0.472	2.500	0.4207	0.8444	0.9048

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	ition (p > 0).01)		0.93524		0.858		-0.843	1.04974
Equality of variance cannot be co	nfirmed		<u> </u>		· .					
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			0.37906	0.44104	0.02488	0.04248	0.71117	5, 12

			Line	ear Interpol	ation (200 Res	ample	s)
Point	mg/L	SD	95% CL(Exp)	Skew			
IC05	5.7250		<u>···</u>	<u> </u>		•	
IC10	>1000					-	
IC15	>1000		•			1.0 —	·
IC20	>1000				I	0.9	
IC25	>1000					0.8	
IC40	>1000					- 4	
1C50	>1000			•		0.7	
						0.6	
					88	0.5	
					Response	0.4	•
	,	,		:	· İş	0.3	
					č	0.2	•
						- 4	_
	•					4	*
						0.0 🛉	
					• •	-0.1 🖥	
						-0.2 🕂	

200

400

Dose mg/L

600

800

1000

Test ID: 0211-335 Sample ID: BEAZER
Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMDSA - Benzene Metadisulfonic Acid
Protocol: EPAA 93-EPA Acute Test Species: CD-Ceriodaphnia dubia

Comments: Industrial product testing

11/27/2002

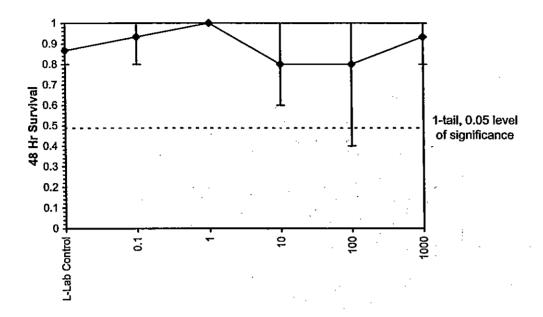
11/29/2002

Start Date:

End Date:

Sample Date:

Dose-Response Plot



48 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Beuzer	Start Date & Time: 11/27 (02 14:30
Sample ID: BMSA	End Date & Time: 11 29 02 1330
Contact:	Test Organism: <u>C. dubia</u>
Test #: 1211-336	Test Protocol: ETA WET 1994, ETA GOPTS 199

	`				· ·												
Concentration		N	umber	of	Disso	lved O	xygen		pН			nducti	-	Te	mpera	ture	_
male	Rep	Live	Organ	isms		(mg/L))	(P	H uni	ts)	(µ:	mhos-	cm)	<u> </u>	<u>(°C)</u>		Percent
""\}	,	0	24	48	0	24	48	0	24	48	0	24	48	0 ·	24	48	Survival
Lab Whitel	A	.5	5	5	8.2		8.5	8.24		8.15	179	سسند	189	24.7	243	246	100
10-112 V 1.112 1	В	5	5	5	.7.7												100
	С	5	3	3							1						60
n.I mall	Ā	5	₹	5	82	_	8.5	822	_	8,21	179	1	187	247	243	246	100
10.1.119.10	В	5	7	5	Y Y PRINT		10.7										100
	c	玄	4	5													100
1000012	Ā	5	*	<u>u</u>	8.7	2-1-4-1	2.5	8.19		8,4	180		188	247	243	24.6	80
1.0 mg/L	В	3	1							Ť							100
	C	5	-	5								100					100
10 100 27	Ā	5		سر	81		8.5	823		820	181		187	24.7	74.3	246	100
10 mg 16	В	3	2	ئر	0.1				TOTAL ACTOR					1			100
	С	5	ग्रेड	7				L							i i		100
100		5	200	<u>5</u>	φ.,	_	8.5	8.74	المسادية	842	210	2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	220	247	243	24.6	100
100 mg/L	A		<u> </u>	-	0.1	3 (18 a 1983)		O . AT		NAME OF TAXABLE PARTY.							100
	В	5	5	3				-			in same		il de de la composición dela composición dela composición dela composición dela composición de la composición dela composición de la composición dela c	1			100
	С	5	5	<u>, , , , , , , , , , , , , , , , , , , </u>	2 7		0.1	070	المعتشما	V 23	p='p='/>		561	241	24.3	216	
1000 mg/r	A	5	2	7	8.3	;	8.6	6.47		0,01	550		361	V.	(,)		80
	В	5	5_	4		<u> </u>					-, -						80
	С	5	5	4		L		لسيا			ننياناً:	<u> </u>	ستاس				80
Technician Initi	als	AH	BR	50													

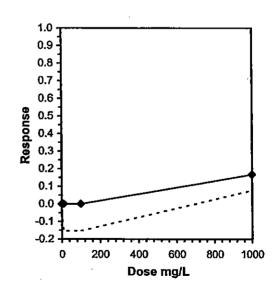
Animal Source:	internal	Date Received:	
Comments:		test, Fed prior to initiation	AMEC Earth and Environmental
	24 hrs:		5550 Morehouse Dr., Suite B
OA Check:	865 12/02/07	Final Review: 86 (1463	San Diego, CA 92121 (858) 458-9044

		_		Daphnia Acute Survival Bioa	ssay-48 Hr Surv	ival
Start Date:	11/27/2002	<u> </u>	Test ID:	0211-336	Sample ID:	BEAZER
End Date:	11/29/2002	<u> </u>	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	BMSA - Benzene Monosulfonic Acid
Sample Date:			Protocol:	EPAA 93-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial p	product i	testing		-	·
Conc-mg/L	1	2	3			
L-Lab Control	1.0000	1.0000	0.6000	-		,
0.1	1.0000	1.0000	1.0000			
1	0.8000	1.0000	1.0000			
10	1.0000	1.0000	1.0000			
100	1.0000	1.0000	1.0000			
1000	0.8000	0.8000	0.8000			

-		_	Tra	ansform: .	Arcsin Sc	uare Root	t i		1-Talled		Isotonic		
Conc-mg/L	Mean	N-Mean	Mean	Mln	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean	
L-Lab Control	0.8667	1.0000	1.1922	0.8861	1.3453	22.238	3				0.9600	1.0000	
0.1	1.0000	1.1538	1.3453	1.3453	1.3453	0.000	3	-1.538	2.500	0.2489	0.9600	1.0000	
. 1	0.9333	1.0769	1.2659	1.1071	1.3453	10.861	3	-0.740	2.500	0.2489	0.9600	1.0000	
10	1.0000	1.1538	1.3453	1.3453	1.3453	0.000	3	-1.538	2.500	0.2489	0.9600	1.0000	
100	1.0000	1.1538	1.3453	1.3453	1.3453	0.000	3	-1.538	2.500	0.2489	0.9600	1.0000	
1000	0.8000	0.9231	1.1071	1.1071	1.1071	0.000	3	0.854	2.500	0.2489	0.8000	0.8333	

Auxiliary Tests	•				Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	-normal dis	stribution (p <= 0.01)		0.73526		0.858		-1.5095	4.45404
Equality of variance cannot be co	nfirmed		-							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			0.20807	0.24099	0.02972	0.01487	0.15106	5, 12

	•			Linea	ar Interpolation	n (200 Resamples)
Point	mg/L	SD	95% C	L(Exp)	Skew	
IC05	370.00	88.19	0.00	606.25	-1.3275	•
IC10	640.00	112.56	181.00	1112.50	0.1248	
IC15	910.00					1.0
IC20	>1000					0.9
IC25	>1000					-
IC40	>1000					0.8 -
IC50	>1000					0.7



Test ID: 0211-336 Sample ID: BEAZER
Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMSA - Benzene Monosulfonic Acid
Protocol: EPAA 93-EPA Acute Test Species: CD-Ceriodaphnia dubia

Comments: Industrial product testing

11/27/2002

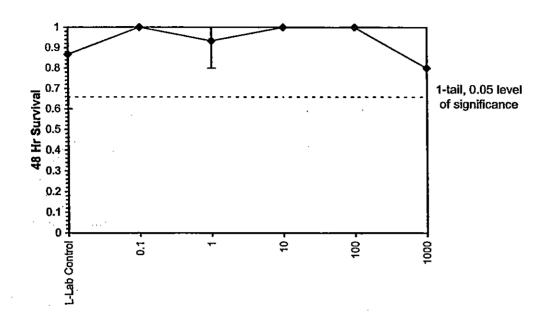
11/29/2002

Start Date:

End Date:

Sample Date:

Dose-Response Plot



Freshwater Acute

48 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Blazu	Start Date & Time: 11/27/02 14:30
Sample ID: PSA	End Date & Time: 11 29 02 13 20
Contact:	Test Organism: <u>C. dubia</u>
Test #: 1)21 - 334	Test Protocol: ERA WET 1994, EPA OPPTS 199

Concentration	1		lumber		Disso	lved O			pН			nducti	•	Te	трега	ture	
male	Rep	Live	Organ	iisms		(mg/L))	(F	H uni	ts)	(μι	nhos-c	m)	<u> </u>	(°C)		Percent
. "		0	24	48	0	24	48_	0	24	48	0	24	-48	0	24	48	Survival
lab cont.	A	5	5	Н	8.1	-	8.4	8.04	-	8.17	178	-	186	24.7	243	24.6	80
	В	5	5	5													100
	С	5	3	5													100
0.1 mg/	Α	5	5	5	80	ı	8.5	804	; -	8.20	179	,	187	247	24.3	24.6	100
	В	5	5	5	Y.												100
	С	5	5	5								La la casa e si		<u> </u>			100
1.0	Α	5	5	5	80		8.5	803	_	8.22	179		189	24.7	24.3	26	100
	В	5	5~	5												, é eig	100
	С	5	5	5				7.			in and and a second		1 3 3 3				100
10	A	5	3	5	8.0	1	8:5	8.01	-	8.23	180	_	191	241	24-3	છ(.6	100
	В	5	3	5													100
	С	5	5	5									در کید				100
100	A	5	5	2	80		8.4	7.83	-	8.24	208		441	24.1	143	46	40
	В	5	5	4							1 1K &						80
	С	5	5	5												المندا	100
1000	A	3	5.	4	81)	8.5	7.43	~	8.05	454	<u>_</u>	458	24.7	24.3	246	80
	В	5	4	4					ورون دورو						1		80
	С	5	5	سخ						2.6						1. 4.	100
Technician Initi	ais	AH.	BR	80]								-				

Animal Source:	Inte	rnal	Date Receive	d: <u>NA</u>	·	
Comments:	0 hrs:	range finder	test, fed	prior to	Initiation	
	24 hrs:			· -		AMEC Earth and Environmental
	48 hrs:				<u> </u>	5550 Morehouse Dr., Suite B
OA Check:	BUS	12/02/02	Final Review	w: Ob UHO	<u>3_</u>	San Diego, CA 92121 (858) 458-9044

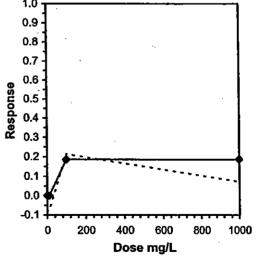
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				Daphnia Acute Survival Bioa	ssay-48 Hr Surv	ival
Start Date:	11/27/2002	:	Test ID:	0211-334	Sample ID:	BEAZER
End Date:	11/29/2002	2	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	PSA - P-Phenol Sulfonic Acid
Sample Date:			Protocol:	EPAA 93-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial p	oroduct :	testing		-	-
Conc-mg/L	1	2	3	· 		
L-Lab Control	0.8000	1.0000	1.0000)	·	*
0.1	1.0000	1.0000	1.0000			
1	1.0000	1.0000	1.0000			
10	1.0000	1.0000	1.0000			
100	0.4000	0.8000	1.0000)		
1000	0.8000	0.8000	1.0000	1		

			Tra	ansform:	Arcsin Sc	uare Roof	t		1-Tailed	Isotonic		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.9333	1.0000	1.2659	1.1071	1.3453	10.861	3				0.9833	1.0000
0.1	1.0000	1.0714	1.3453	1.3453	1.3453	0.000	3	-0.615	2.500	0.3224	0.9833	1.0000
1	1.0000	1.0714	1.3453	1.3453	1.3453	0.000	3	-0.615	2.500	0.3224	0.9833	1.0000
10	1.0000	1.0714	1.3453	1.3453	1.3453	0.000	3	-0.615	2.500	0.3224	0.9833	1.0000
100	0.7333	0.7857	1.0457	0.6847	1.3453	31.991	. 3	1.707	2.500	0.3224	0.8000	0.8136
1000	0.8667	0.9286	1.1865	1.1071	1.3453	11.587	3	0.615	2.500	0.3224	0.8000	0.8136

Auxiliary Tests	_				Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribເ	ntion (p > 0).01)		0.8635		0.858		-0.5642	3.54151
Equality of variance cannot be co	nfirmed		-							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	: MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			0.25445	0.27965	0.04383	0.02495	0.19646	5, 12

	Linear Interpolation (200 Resamples)										
Point	mg/L	SD	95% CL(Exp)	Skew							
IC05	34.136										
IC10	58.273		•								
IC15	82.409			1.0							
IC20	>1000			0.9							
IC25	>1000			. ↓ ↓							
IC40	>1000			0.8 -							
IC50	>1000										
				0.6-							
÷				9 0.5 -							



Test ID: 0211-334 Sample ID: BEAZER
Lab ID: AEESD-AMEC Bioassay SD Sample Type: PSA - P-Phenol Sulfonic Acid
Protocol: EPAA 93-EPA Acute Test Species: CD-Ceriodaphnia dubia

Comments: Industrial product testing

11/27/2002

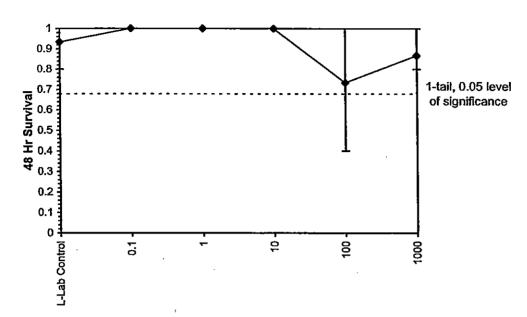
11/29/2002

Start Date:

End Date:

Sample Date:





Ceriodaphnia dubia
Chronic Exposure

Bioassay Laboratory Seven Day Chronic Bioassay 5550 Morehouse Dr., Suite B C. dubia Test Species: San Diego, CA 92121 Test Date/Time: Client: Test No: Sample ID: 10 ma Lab contro Concentration Concentration Day Day 8.15 8.33 8.26 18.14 8.20 pli 8.12806 201 8.28 3.03 pH ٦.٩ DO (mg/L) DO (mg/L) 189 203 180 188 184 Cond. (jumlios-cm) 178 190 177 180 182 195 247 245 24.2 24.0 Cond. (jumbos-cm) Temp (°C) Temp (°C) 18/6 18-02 9.03 8.04 8.17 8.11 8.16 8.12 18:08 1824 18:05 18:66 18:02 p41 пH DO (ing/L) DO (mg/L) 24.4 24.4 24.3 29.1 Temp (°C) Temp (°C) 100 ma mall Concentration Concentration Day Day a Initial 8.10 874 8.29 8.09 8.2 8.6 7.8 7.8 192 179 191 181 24.0 24.0 24.0 24.1 ull · pH 236 244 DO (mg/L) 234 258 236 244 23.9 24.0 64.0 24.0 DO (mg/L) Cond. (umhos-cm) 179 179 Cond. (umbos-em) Temp (°C) 24.0 Temp (°C) 8.18 31K 817 8.52 8.04 8.06 8-3 8.3 87 8.0 7.8 7.9 820 815 8.08 827 8.01 3.07 8.04 pH 30 pH DO (mg/L) DO (mg/L) 24.6 24.4 24.7 24.1 24.6 24.2 Temp (°C) 243 246 244 243 Zel Temp (°C) 1.0 mg 12 Concentration Concentration Day Lukhil 8.29 829 8.38 8.20 nlt 18-20 8-14 8.25 18.26 pil DO (mg/L) 82 8 DO (mg/L) Cond. (jumbos-cm) 192 129 182 180 180 Cond. (nmhos-cm) Temp (°C) 247 243 24.3 240 240 240 Temp (°C) 832 8.20 8.17 8.25 8.10 8.04 8.12 83 8.3 8.4 87 7.9 4.0 8.1 24.3 24.6 24.4 24.7 24.1 24.6 24.2 823 8.15 8.08 7818 8.01 8.05 8.05 pll Hg DO (ing/L) DO (mg/L) 243 246 244 242 ZAM ZA 1242 Temp (°C) Temp (°C) minac finder test Comments: Date Received: Animal Source: Final Review: 4/4/ QA Check: The same of the same and the same of the s Land to the second of the second

tial fina enu-

AMEC Earth and Environmental **Bioassay Laboratory** 5550 Morehouse Dr., Suite B San Diego, CA 92121

Test Number:

Client/Sample ID: BUAZUT | BMDSA

Start Date: W27/2

End Date:

Start Time: 14 40

End Time: 1330

			٠.	Daily .	Reprod	uction/	Survival			<u> </u>	
Conc.	Rep		2	3	4	5	6	7	8	Total	QA
1-0	1	Ð	10/d	-	_	—	Ţ <u> </u>		_	0(2	
	2	ن	0	0	0	0	0	4		Q	4.4
	3	0	0	0.	.6	8	12	Ó	_	26	
	4	0	0	-#-	8	6	0	2		20	
	5	0	0	0	2	4	0	9	-	15	
Analyst	5#	118	50	AH.	06	Mg	AH	514			

				Daily 1	Reprod	uction/ S	urvival				
Conc.	Rep	1	2	3	4	5	6	7	8	Total	QA
0 male	1	6	0/2		_	<u> </u>				0/2	
	2	0	D	D	6	T5	10	0	ţ	9)	
	3	0	0	0	6	5	8	0	-	19	
	4	0	0	6	4	Ø	7	14	1	25	3/
	5	0	0	0	4	ر5	9	G	٠	18	

				Daily l	Reprod	uction/	Survival				
Conc.	Rep	1	2	3	4	- 5	6	7	8	Total	QA
0.1 mg/2	- 1	0	0	()	3	9	12	0		24	
	. 2	Ð	-0	O	3	6	9	0	1	18	L
	3	0	Q	0	2	6	8.	0	1	No.	
	4	0	0	O	4	0	\mathcal{H}	0	1	\$	O.AH
	5	0	Ø	7	7	O_	110	12	+	36	

				Daily 1	Reprod	luction/S	Survival			}	
Conc.	Rep	1	2	3	4	5	б	7	8	Total	QA
100 male	1	O	0	0	0_	4	9	Q		13	
	2	0	ð	0	3	2	0	3	-	8	3/11
	3	0	0	3		0	0	0		4-	
	4	0	0	6	6	0	9	15	~	36	Ĺ
	5	0	0	0	4	6	9	0		19	

		•		Daily	Reprod	uction/	Survival			ŀ	
Conc.	Rep	1	2	3	.4	5	6	7	8	Total	QA
1.0 mg/	1	0	ø	0	3	4	0	7		17	· .
	2	0	0	۵	0	O	149	0	1	+	OAH
	3	0	0	0	5	7_	9	6		2	
	4	0	0	0	0	0	0	0		D	
	5	Ø	0		6	8	9	0		23	

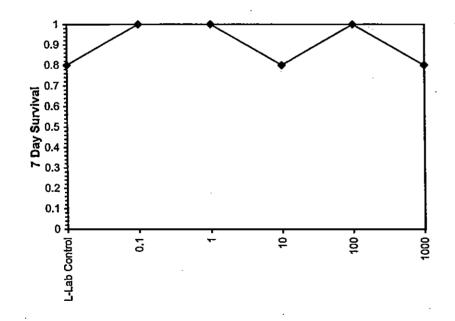
			<u>.</u>	Daily I	Reprod	uction/ S	urvival].	
Conc.	Rep	i	2	33	4	5	6	7	8	Total	QA
100012	1	0	0	5	5	0	14	0	1	24	
	2	0	0	0	6	Oí	12	6	_	28	
	3	Α	0	5	6	0.	9	14	_	34	
	4	0	0	0	8	14	G.	٥	,	20	OAH
	5	0	0	00	_	_	-	-		old	

Time Fed (day): (0) 14:	40 (1) 0930 (2) 1220	(3) (015 (4) 15 15	(5 <u>) 1400</u> (6	<u>6/5 · 3d (7) 245 (8)</u>	<u>-</u>	
Comments:			QA C	Check: 44 (B	Final Review:	Sp UHloz

ŝ									
ì		_	-	Cerioda	phnia Sur	vival and I	Reproduction Test-7 Day	Survival	
•	Start Date:	11/27/2002	2	Test ID:	0211-349		Sample iD:	BEAZER	
ľ	End Date:	12/04/2002	2	Lab ID:	AEESD-AI	MEC Bioas	say SD Sample Type:	BMDSA	
ŀ	Sample Date:			Protocol:	EPAF 94-6	EPA Freshv	water Cl Test Species:	CD-Ceriodaphnia dubia	
•	Comments:	Industrial	product to	esting					
r	Conc-mg/L	1	2	3	4	5			
	L-Lab Control	0.0000	1.0000	1.0000	1.0000	1.0000			
l	0.1	1.0000	1.0000	1.0000	1.0000	1.0000			
	1	1.0000	1.0000	1.0000	1.0000	1.0000			
	10	0.0000	1.0000	1.0000	1.0000	1.0000			
	100	1.0000	1.0000	1.0000	1.0000	1.0000			
i	1000	1.0000	1.0000	1.0000	1.0000	0.0000			

					Not			Flsher's	1-Tailed	
.	Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	
	L-Lab Control	0.8000	1.0000	1	4	5	5	-		
1.	0.1	1.0000	1.2500	0	5	5	5	0.5000	0.0500	
	1	1.0000	1.2500	0	5	5	5	0.5000	0.0500	
•	10	0.8000	1.0000	1	4	5	5	0.7778	0.0500	,
1	100	1.0000	1.2500	0	5	5	5	0.5000	0.0500	
S . :	1000	0.8000	1.0000	1	4	5	5	0.7778	0.0500	

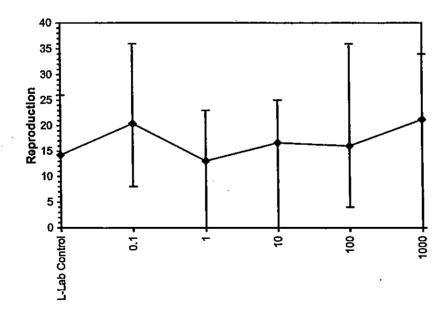
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	 	
Fisher's Exact Test	1000	>1000				



	- .		Cerioda	aphnia Sur	vival and Rep	roduction Test-Repr	oduction
Start Date:	11/27/2002		Test ID:	0211-349		Sample ID:	BEAZER
End Date:	12/04/2002	!	Lab ID:	AEESD-AN	MEC Bioassay S	SD Sample Type:	BMDSA
Sample Date:			Protocol:	EPAF 94-E	PA Freshwater	r Cr Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial p	product t	esting				
Conc-mg/L	1	2	3	4	5		
L-Lab Control	0.000	10.000	26.000	20.000	15.000		
0.1	24.000	18.000	16.000	8.000	36.000		
1	17.000	4.000	21.000	0.000	23.000		
10	0.000	21.000	19.000	25.000 .	18.000		
100	13.000	8.000	4.000	36.000	19.000		
1000	24.000	28.000	34.000	20.000	0.000		

<u> </u>			•	Transfor	m: Untran	sformed			1-Tailed		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	
L-Lab Control	14.200	1.0000	14.2000	0.0000	26.0000	69.786	5				
0.1	20.400	1.4366	20.4000	8.0000	36.0000	51.131	5	-0.888	2.360	16.4806	
1	13.000	0.9155	13.0000	0.0000	23.0000	79.756	5	0.172	2.360	16.4806	
10	16.600	1.1690	16.6000	0.0000	25.0000	58.188	5	-0.344	2.360	16.4806	•
100	16.000	1.1268	16.0000	4.0000	36.0000	78.187	5	-0.258	2.360	16.4806	
1000	21.200	1.4930	21.2000	0.0000	34.0000	60.993	5	-1.002	2.360	16.4806	

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	ition (p > 0).01)		0.98161		0.9		-0.2124	-0.4548
Bartlett's Test indicates equal var	iances (p =	0.99)			0.57582		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TÜ	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			16.4806	1.16061	54.14	121.917	0.81325	5, 24



litia Fin hem Bionssay Laboratory Seven Day Chronic Bioassay 5550 Morehouse Dr., Suite B Test Species: San Diego, CA 92121 02: 14:30 Test Date/Time: Client: .DZ11- 350 Test No: Sample ID: mall lab control Concentration Concentration Day Day 8.24 8.20 7.29 8.20 8.10 pH 8.24 8.6 8.12 8.06 8/3 8.21 8.67 pH 8.5 8.2 8.1 DO (mg/L) . 8.2 8.5 8.0 DO (nig/L) 185 198 183 184 184 Cond. (nunhos-cm) 179 186 190 Cond. (ninhos-cm) Z4.7 24.2 24.3 24.0 24.0 24.0 Temp (°C) 24.3 240 240 24.0 Temp (°C) 8.30 8.17 8.22 84 805 6.05 8.06 nll 8,16 8,17 809 18.01 18.02 8.07 pll 8.6 79 8.0 8.3 8.5 86 DO (mg/L) DO (mg/L) 244 242 24.1 24.6 24.2 Temp (°C) 24.6 24.4 24.7 24.1 Temp (°C) ma 100 mal Concentration Concentration 6 Day 8.26 8.23 869 8.19 867 1.97 8.23 8.09 8.28 8.17 Ilg nII 8.2 8.6 DO (mg/L) 8-0 DO (mg/L) Cond. (jumbos-em) 79 177 179 189 Cond. (junhos-em) 24.2 24.0 CEO Temp (°C) 247 24.3 24.3 84.0 24.0 240 Temp (°C) 8.31 8 18 8.22 872 8.03 60.00 8.08 nH 8,25 8,6 8,20 84 pH 8.4 87 DO (mg/L) DO (mg/L) Temp (°C) 24.3 244 243 241 241 Temp (°C) 1.0 mg/L Concentration Concentration Day ZIMBUM. fulflals 8.29 8.32 8.30 8.30 8.34 8.23 8.16 B. 19 8.08 8.23 8-14 9009 8.19 pH llg 8.8 63 8.9 8.2 541 568 5 35 542 8-1 8.5 9.2 85 7.9 DO (mg/L) DO (mg/L) 179 192 179 181 24.3 24.0 24.0 24.0 Cond. (jumhos-em) 136 180 Cond. (umhos-cni) 24.7 44 24.2 240 240 Temp (°C) Temp (°C) 8.40 8.15 8.23 817 810 8.00 8.08 9,28 8,16 8.21 7 C(1 8,05 16,00 8.09 pll pН 8.5 8.2 8.5 86 DO (mg/L) DO (mg/L) 241 741 246 24,2 24.3 29.6 24.4 74.3 24.1 Temp (°C) Temp (°C) Comments: Date Received: Animal Source: Final Review: W 414 LOR QA Check: The transfer of the contract of

AMEC Earth and Environmental Bioassay Laboratory 5550 Morehouse Dr., Suite B San Diego, CA 92121

Test Number:

Client/Sample ID: Blazer | BMSA

0211-350

Start Date: 11/07/07

End Date: 1> 4 02

Start Time: 1430

DL

End Time: 1400

		:		Daily .	Reprod	uction/ S	Survival]	
Conc.	Rep	1	2	3	4	5	6	7	8	Total	QA
1.0	1	C	12	Ø	5	9	15	\	~	129	
	2	. 0	o	0	6	8	13	1	-	27	
	3	6	0	0	6	IÌ.	15	√		32	
	4	6	0	O	6	8	14	/		28	
	-	<u> </u>	0	0	1	6	175	/	-	27	16

		•	Daily !	Reprod	uction/	Survival]	
Rep	j	2	3	4	5	6	7	8	Total	QA
1	o'	0	0	4	٦	10	✓	<u> </u>	191	<u></u>
2	7	0	6	O	8	14	V		l∂8_	
3	Δ.	O	ð	5	5	12	1		22	
4		0	0	8	7	14	V	-	29	
5	0	D	6	5	0	0		-	l l l	0
	Rep 1 2 3 4 5	Rep 1 0 2 0 3 0 4 0 5 0	Rep 1 2 1 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0					Rep 1 2 3 4 5 6 7 1		

		1						Ć.,		, , , , , , , , , , , , , , , , , , , 	
				Daily l	Reprod	uction/ S	Survival		arawa kata ka	_	
Conc.	Rep	i	2	3	4	5	6	7	8	Total	QA
D. I male	1	D	0	0.	6	12	15	- 🗸	~	33	
Ĭ	2	0	0	0	6	6	10	\	1	22	
	3	0	old		_	_	-		-	old	
	4	6	<u>ي</u>	O	6	9	14	\	•	29	
	5	0	0	0	4	13	15-	/_	-	33	12

				Daily	Reproc	luction/	Survival				
Conc.	Rep	i	2	3	4	5	6	7	8	Total	QA
100 malu	1	٥	0	٥	6	18	14	V	-	28	
	2	ð	0	0	6	a	/3	1		28	
	3	Δ.	0	5	0	11	20	√	<u> </u>	36	
	4	0	0	0	6	3	6	1		15	
	5	0	O.	0	6	4	-0	1	<u> </u>	10	0

				Daily l	Reprod	uction/ S	Survival				
Conc.	Rep	1	2	3	4	5	6	7	8	Total	QA
1.0 mal	4 1	0	0	ola	-	T -	T'	-		0/0	
	2	0	D	۵	7	4	12	. 🗸] -	26	
	3	0	0	Ď	7	ह	160/	1	~	31	
	4	ð	0	٥	(a	17	18	1		7	
	5	0	ŏ	0	3	12	113	1	_	25	- 1/

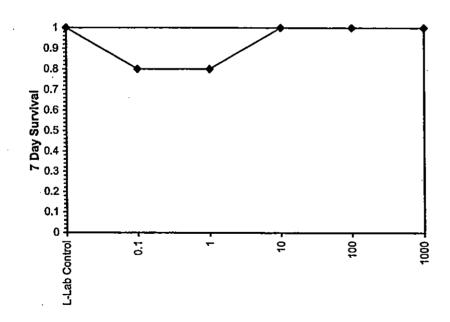
	[Daily I	Reprod	uction/ S	Survival	11221222222	*		•
Conc.	Rep	1	2	3	4	5	6	7	8	Total	QA
1000 L	1	0	0	0	4	10	14	V		28	
	2	^	0	0	6	8	13	V	_	27	
	3	0	ð	6	ક	0	15	V	_	29	· .
	4	_ <u></u>	0	0	6	8	7	V	- _	121	
	5	Ô	O	0	6	4	0	/ _	7	10	ь

Time Fed (day); (0) 1430 (1) 6936 (2) 1280	(3)1040 (4) 1505 (5) 1330 (6) 1600 (7) 460 5H(8)	
Comments:	QA Check: 9 1/14/3	Final Review: A 1410

			Cerioda	phnia Sur	vival and I	Reproduction Test-7 D	Day Survival
Start Date:	11/27/2002	2	Test ID:	0211-350		Sample ID:	BEAZER
End Date:	12/04/2002	2	Lab ID:	AEESD-AN	AEC Bioas	say SD Sample Type:	BMSA
Sample Date:						vater ChTest Species:	CD-Ceriodaphnia dubia
Comments:	Industrial	product to	esting			·	•
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000		
0.1	1.0000	1.0000	0.0000	1.0000	1.0000		
1	0.0000	1.0000	1.0000	1.0000	1.0000		
- 10	1.0000	1.0000	1.0000	1.0000	1.0000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		
1000	1.0000	1.0000	1.0000	1.0000	1.0000		

					Not			Fisher's	1-Tailed	
	Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	
	L-Lab Control	1.0000	1.0000	0	5	5	5			
L,	0.1	0.8000	0.8000	1	4	5	5.	0.5000	0.0500	
	1	0.8000	0.8000	1	4	5	5	0.5000	0:0500	
9	10	1.0000	1.0000	0	5	5	5	1.0000	0.0500	
	100	1.0000	1.0000	0	5	5	5	1.0000	0.0500	
٠,	1000	1.0000	1.0000	0	5	5	5	1.0000	0.0500	

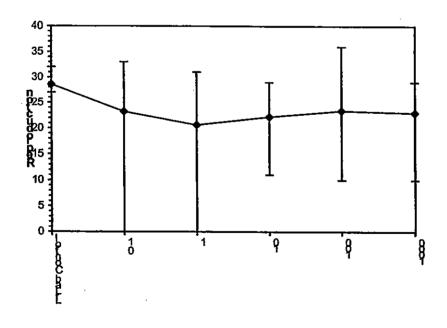
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TÜ	
Fisher's Exact Test	1000	>1000			



			Ceriod	aphnia Su	rvival and Repre	duction Test-Rep	roduction
Start Date:	11/27/2002		Test ID:	0211-350		Sample ID:	BEAZER
End Date:	12/04/2002	!	Lab ID:	AEESD-AI	MEC Bioassay S	D Sample Type:	BMSA
Sample Date:						Cr Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial p					•	
Conc-mg/L	1	2	3	4	5		
L-Lab Control	29.000	27.000	32.000	28.000	27.000		
0.1	33.000	22.000	0.000	29.000	32.000	•	
1	0.000	26.000	31.000	21.000	25.000		
10	21.000	28.000	22.000	29.000	11.000		
100	28.000	28.000	36.000	15.000	10.000		
1000	28.000	27.000	29.000	21.000	10.000		

				Transform	n: Untran:	sformed		Rank	1-Tailed	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
L-Lab Control	28.600	1.0000	28.600	27.000	32.000	7.251	5			
0.1	23,200	0.8112	23.200	0.000	33.000	58.896	5	28.00	16.00	
1	20.600	0.7203	20.600	0.000	31.000	58.515	5	19.00	16.00	
10	22.200	0.7762	22.200	11.000	29.000	32.389	5	21.00	16.00	
100	23.400	0.8182	23.400	10.000	36.000	45.388	5	25.00	16.00	
1000	23.000	0.8042	23.000	10.000	29.000	34.373	5	22.00	16.00	

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	-normal dis	stribution (p <= 0.01)		0.88877	0.9	-1.1607	0.96516
Bartlett's Test indicates equal var	iances (p =	0.07)			10.1316	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	1000	>1000						



litia Fin Bioassay Laboratory Seven Day Chronic Bioassay 5550 Morehouse Dr., Suite B Test Species: San Diego, CA 92121 127/02 14:15 Test Date/Time: Client: 1 0211-348 Test No: Sample ID: mall 10 Ialo contro Concentration Concentration Day 8.0/ 8.209 8.10 8.16 8.26 8.14 8.16 B.12 8.06 8.27 8.19 8.06 nll Ifq 8.128 8.3 8.2 8.3 8.0 7.7 DO (mg/L) . DO (mg/L) 185 196 186 185 178 1686 4185 40 177 178 Cond. (numbos-em) Cond. (umhos-cm) 247 245 24.6 24.0 24.0 24.0 Temp (°C) Temp (°C) 8.17 8.21 84 8.05 8.05 8.07 pH 1822 8,13 8,15 1807 8.0 8.52 8,06 pli 4.0 8,0 DO (mg/L) DO (mg/L) Temp (°C) Temp (°C) mall 100 ma Concentration . Concentration Day esse (pittals mitiat 7.83 8.450 7.89 1.93 804 7.95 7.93 80 8.1 8.4 8.2 8.4 8.6 7.9 p)1 8.04 8.17 8.14 8.17 8.29 8.17 8.10 pH 8.4 8.2 8.4 8.6 209 223 24 212 DO (mg/L) B.174 8.3 8.1 DO (mg/L) Cond. (jumbos-cm) 179 179 180 190 177 181 247 245 24-624.0 260 240 Cond. (junhos-cm) 24.5 24.0 2900 240 Temp (°C) Temp (°C) 5.27 8.16 8.19 807 8.02 8.04 8.10 8.31 8.16 8.18 84 8.03 8.04 8.06 110 pil 8,4 85 8.0 7.9 DO (mg/L) DO (mg/L) Temp (°C) 24.3 246 24.4 24.2 24.1 24.6 24.2 Temp (°C) 1000 Concentration Concentration Day Day 7.43 251 7.39 7.45 746 2.49 7.44 8.1 8.31 8.7 8.4 8.8 3.2 8.0 454 540 448 473 444 452 451 8.03 8.24 8.15 8.19 8.29 8.17 8.11 11anii DO (mg/L) 8.0 8.1 8.3 8.2 8.3 8.0 DO (mg/L) 179 (80 180 192 179 181 Cond. (umhos-cm) Cond. (jimhos-cm) 24.7 26.0 34.0 24.0 24.0 24.7 24.5 24.7 24.0 240 24,0 24.1 Temp (°C) Temp (°C) 8.83 8-02 3.05 510 7294 8.018.01 3.28 8 8 8,22 784 DH nH 8.6 8.2 8.4 85 8.0 04.3 24.6 244 247, 24.1 DO (ing/L) DO (mg/L) Temp (°C) 243 246 244 243 241 24,6 24; Temp (°C) range finder test Analysis: 50 Comments: Date Received: NA Animal Source: Final Review: & U14 03 OA Check: and the control of the

AMEC Earth and Environmental Bioassay Laboratory 5550 Morehouse Dr., Suite B San Diego, CA 92121

Test Number:

Client/Sample ID: BLAZUT / PSA

Start Date: 11/27 08

End Date: 17 4 0

Start Time: 14:15

End Time: 130

		_		Daily 1	Reprodu	action/	Survival				
Conc.	Ref	8 1	2	3	4	5	6	7	8	Total	QA
11	1	S 6	Ď	n	0	٥	(Ø	√	سب	0	
	2	6	Ö	5	9	0	15	1	-	29	
	3		D	٥	7	5	114	V		23	
	4		0	ΰ	7	6	12	✓		25_	
	5	0	0	0	6	7	10	V	1	23	11
Analyst	10.	BRI	1 80	444	06	MD	8K	SH]	ØЬ
		- JW(

			•	Daily I	Reprodu	uction/	Survival				
Conc.	Rep		2		4	5	6		8	Total	QA
10 mil	1	0	0	מ	3	10	79	√	~	22	
Ĭ	2	٥	0	5	O	11	16	V		32	
	3	0	0	0	6	9	15	/ _	_	30	
	4	ō	0	old		_		_		old	
	5	٨	0	0	4	7	13	V	—	24	リレ

				Daily I	Reprodu	iction/	Survival				
Conc.	Rep	1	2	3	4	5	6		8	Total	QA
h.l mal	1	0	0	D	10	4		\	1	21	
	2	0	ò	0	6	8	12	\	į	26	
	3	6	0	0/0		-			1	pld	
	4	0	0	Ó	5	10	13	~	١	28	
	5	ō	0	0	Ч	7	9	1		30	8

				Daily 1	Reprod	uction/ S	urvival	residential de la constantial de la co	a sa na sa na sa na sa na]	
Conc.	Rep	1	2	3	4	5	6	7	8	Total	QA
M mall	1	0	0	0	4	77	12	V	_	3	
	2	C	0	0	4	8	11	V	~	23	
	3		0	0	5	4	13	1		26	
	4		0	0	6	9	13	1		28	
	5		0	0	-3	S	10	/	٠,-	18	1]

			Daily Reproduction/Survival											
Cone	Rep		2	3	4	5	6	7	8	Total	QA			
I.O mal	t i	Ó	0	Ò	7	9	13	V	1	39				
	2	0	012	_	-		ر سور	1		810				
	3	0	0	٥	7	8	15	\	1	30				
	4	0	012		-	-		1	-	Old				
	5	0	9	0	7	0	14	Y		3	16			

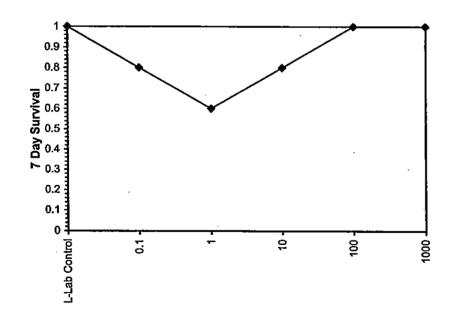
				Daily	Reprod	luction/	Survival			<u> </u>	
Conc.	Rep	1	2	3	4	5		7	8	Total	QA
1000	1	0	0	0	3	3	6	V		112	
	2	0	0	0	3	6	و	1	_	115	
	3	0	Ó	6	5	0	4	Ý		15	
	4	0	0	0	3	7	3,_		_	13	
	5	0	0	0	2	3	14	\ <u>\</u>	_	13	8

Time Fed (day): (0) 1415 (1) 1930 (2) 1240 (3) 050 (4) 1500 (5) 12	130 (0 1015 (7) +100 sh(8)	<u> </u>
Comments:	QA Check: WINB	Final Review: 2 1/4/03

			Cerioda	phnia Sur	vival and Re	production Test-7 Da	y Survival
Start Date:	11/27/2002	2	Test ID:	0211-348		Sample ID:	BEAZER
End Date:	12/04/2002	2	Lab ID:	AEESD-AN	MEC Bioassay	y SD Sample Type:	PSA
Sample Date:						ter Ct Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial :					•	,
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000	, 	2
0.1	1.0000	1.0000	0.0000	1.0000	1.0000		
· 1	1.0000	0.0000	1.0000	0.0000	1.0000		
10	1.0000	1.0000	1.0000	0.0000	1.0000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		
. 1000	1.0000	1.0000	1.0000	1.0000	1.0000		

8,		•			Not			Fisher's	1-Tailed
	Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical
ſ	L-Lab Control	1.0000	1.0000	0	5	5	5		
ì	0.1	0.8000	0.8000	1	4	5	5	0.5000	0.0500
_	1	0.6000	0.6000	2	3	5 .	5	0.2222	0.0500
r	10	0.8000	0.8000	1	4	5	5	0.5000	0.0500
1	100	1.0000	1.0000	0 '	5	5	5	1.0000	0.0500
1	- 1000	1.0000	1.0000	0	5	5	5	1.0000	0.0500

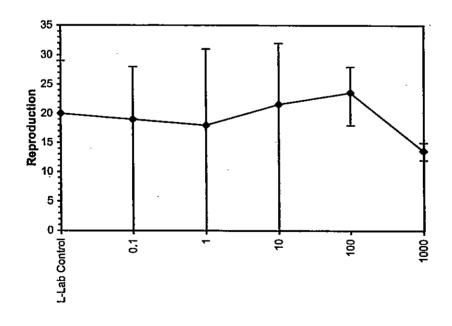
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	
Fisher's Exact Test	1000	>1000			



			Cerioda	phnia Su	vival and Re	eproduction Test-Rep	roduction
Start Date:	11/27/2002	2	Test ID:	0211-348		Sample ID:	BEAZER
End Date:	12/04/2002	2	Lab ID:	AEESD-AI	MEC Bioassa	y SD Sample Type:	PSA
Sample Date:						ter Cr Test Species:	CD-Ceriodaphnia dubia
Comments:	Industrial					•	
Conc-mg/L	1	2	3	4	5		
L-Lab Control	0.000	29.000	23.000	25.000	23.000		Α
0.1	21.000	26.000	0.000	28.000	20.000		
1	29.000	0.000	30.000	0.000	31.000		•
10	22.000	32.000	30.000	0.000	24.000		
100	23.000	23.000	26.000	28.000	18.000	•	
1000	12.000	15.000	15.000	13.000	13.000		

				Transform	n: Untran:	sformed		Rank	1-Tailed	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	
L-Lab Control	20.000	1.0000	20.000	0.000	29.000	57.228	5			
0.1	19.000	0.9500	19.000	0.000	28.000	58.608	5	25.50	16.00	
1	18.000	0.9000	18.000	0.000	31.000	91.372	5	30.50	16.00	
10	21.600	1.0800	21.600	0.000	32.000	59.071	5	29.50	16.00	
100	23.600	1.1800	23.600	18.000	28.000	16.023	5	28.00	16.00	•
1000	13.600	0.6800	13.600	12.000	15.000	9.865	5	20.00	16.00	

Auxiliary Tests				Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal dis	stribution (p <= 0.01)	0.85053	0.9	-1.0686	0.33102
Bartlett's Test indicates unequal	variances (p = 2.86E-	03)	18.0718	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU			
Steel's Many-One Rank Test	1000	>1000					



Pimephales promelas

Freshwater 96-hr Acute with Renewal

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client:		<u>,</u> 24	_	<u>, </u>															11/2		1/0		151						
Sample ID:	<u> </u>	<u> 15</u> 5	<u>A</u>															ime: nism:	b.	00	<u>ma</u>	00/		20					
Contact:			=: .			<u> </u>		<u>.</u> :									_	ocol:		PA		94 c		- 1	EPA .	 790	·5 1	996	
Test #:	02	11-	<u>33°</u>	8												1 62	i Fioi	0001.	<u> </u>	7.4	ν.,	1., 0	~ ~ 					<u>, , , , , , , , , , , , , , , , , , , </u>	
<u></u>									D.0						pŀ	į	-		C	ondu	ctivit	y		Test	Tem	perat	ure		,
			\$ T	1	e				(mg	•			ļ		ւ Hq)						s-cm	•			(°(C)			%
Concentration			Nur						Init.		·		 		Init.	-	F			Init.		<u> </u>			Init.	Fin.			Surv.
male	Rep		ve O 24		_		0	24	48	48	72	96	0	24	48	48	72	96	0 ·	48	48	96	0	24	48	48	72	96	
							•		8.9	40	9 4	0 2	805	1.86	7,70		-	171	182		-	201	200	70.0	20.2	1	20.3	202	100
Lab control	A B		6				y.0	<u> </u>	0.7		0,) · <u>C</u>	0.5																100.
		125		$\overline{}$			70	γ,	88		ሜ ነ	Q.2	803	7.88	774		7.77	7.70	179	214	_	217	20.0	20.0	20.0		20,1	20.0	(00
0.1	A B	13		0	 -		***	7	00			Ď						li											100
		18	10	10			79	% 1	9.9	· —	a.3	Q 2	8,02	7.80	7.75	-	7,78	7-79	180	215		217	20.0	20.0	20.0	_	25.0	200	100
1.0	A B	 -+	10	0		10	1.7	3.7				<u> </u>	Ĭ																(00
			5	10			7,8	7. h	91		g.2	hα	8.03	7.88	7.73		7,17	רן ר	184	230		234	20.0	20.0	20.0	-	79,9	19.9	100
10	A B	0		10	<u>10</u>		10		171																				100
100	A	10	10		0		-, S	7.9	8.7		ግ.\$	7 Q	828	7.9	47.73	ند	7.75	7.78	238	270	-	275	20,0	199	20.0		19.9	19.01	(00
100	B		띖																										100
1000		1					8٥	7.9	9.1		8.3	67	8.15	7.9	67.81		7.84	7.89	741	750	-	747	200	20.0	20.0		19.9	20.0	100
1000	A B	IX	10									0. 0																	(00
	A	19	.10	7	<u>)</u>	1	3000000	200.000		*********		1										Ţ	208						·
	B	1		-		 -																							
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1 echilician ii	IIIIais	<i>y</i>	10	70	7111	100	J																						
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	24 hrs.	_	٠.					<u>.</u>								<u>.</u>	····				-							r., Sui	
	48 hrs.	<u>-L</u>	d <	<u>ره</u>	0	8:0	75														-				Dieg				
	72 hrs.													 -							-				8) 458				
	96 hrs.											 -									-		'	(00)	-,		,		
QA Check:	<u>B</u>	<u>دح_</u>	12/	or	10	2	_					Fir	nai Re	eview	/:_Q	b.	/HL	03		· 	<u>.</u>	r							

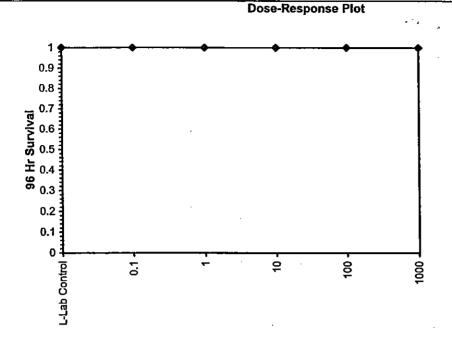
			<u> </u>	Acute Fish Test-96	Hr Survival	
Start Date:	11/27/2002	2	Test ID:	0211-338	Sample ID:	BEAZER
End Date:	12/01/2002	2	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	BMDSA - Benzene Metadisulfonic Acid
Sample Date:	-		Protocol:	EPAA 93-EPA Acute	Test Species:	PP-Pimephales promelas
Comments:	Industrial	product 1	testing			
Conc-mg/L	1	2			1	
L-Lab Control	1.0000	1.0000			•	•
0.1	1.0000	1.0000	1			
1	1.0000	1.0000	İ			
10	1.0000	1.0000	•			<u>.</u>
100	1.0000	1.0000	1			
1000	1.0000	1.0000	•			•

		_	Tra	ansform:	Arcsin Sc	uare Root		Isoto	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
0.1	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
1	1.0000	1.0000	1.4120	1.4120	1,4120	0.000	2	1.0000	1.0000
10	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
100	1.0000	1.0000	1,4120	1.4120	1.4120	0.000	2	1.0000	1.0000
1000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	- 2	1.0000	1.0000

Auxiliary T	ests				Statistic	Critical	<u> </u>	Skew	Kurl
	of the data set o	annot b	e confirmed						
Equality of	variance canno	ot be cor							
	· ·				n (200 Resamples)				
Point	mg/L	SD	95% CL(Exp)	Skew	·			·	
C05	>1000								
IC10	>1000			•					
IC15	>1000				1.0				
IC20	>1000				0.9				
IC25	>1000		•		4	•			
C40	>1000				0.8	. *		- 1	
C50	>1000				0.7				
	•		·		4				
					<u>8</u> 0.6 			Į.	
					0.6 - 0.5 - 0.4 -			1	
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					ĕ ^{0.4} 1				
					0.3				
,					0.2			İ	
				·	4			.]	
					0.1 -			1	
					0.0	 			
					0	200 400	600 80	0 1000	

Dose mg/L

Acute Fish Test-96 Hr Survival Start Date: 11/27/2002 Test ID: 0211-338 Sample ID: BEAZER End Date: 12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMDSA - Benzene Metadisulfonic Acid Sample Date: Protocol: EPAA 93-EPA Acute **Test Species:** PP-Pimephales promelas Comments: Industrial product testing



ToxCalc v5.0

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T	() 6 h-	A CHITC	นากท	кепеии	
Freshwater	70-111	Acute	AAILII	100110110	-

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client:	0-111	~/ /	7			:									Start	Date	e & T	ime: _	<u> 11</u>	187	10	<u>}</u>		510	<u> </u>				
															End	Date	e & T	ime:	12	101	16	<u>し</u>		320					
Sample ID:	15 10	<u> </u>	<u> </u>	•	·	;	,							-	7	Cest (Organ	ism:	φ.	pn	m	<u>ila</u>	<u> </u>						
Contact:	12 V	~ . %	2.7	व		,										Test	Prote	ocol:	EP/	4 19	94 1	NET_	Ę	rA o	<u>የየተና</u>	11	16		
1 est #:	0 0 1	- atta	<u> </u>	2														•			·				<u></u>				
 						Ŧ			D.0	<u> </u>			-		pŀ	I			C	ondu	ctivit	y		Test	Tem	perati	те	1	
			Nun	hor	٥f	- 1			(mg					((pH u				(μmho	s-cm)			(°(<u> </u>			%
Concentration	D	ı	ve O			. ト			Init.			<u> </u>		Γ	Init.					Init.	Fin.				Init.	Fin.			Surv.
mgl	Rep		24			_	0	24	48	48	72	96	0	24	48	48	72	96	0	48	48	96	0	24	48	48	72	96	
		0	24	40	12 3			7 9		-					7.72		7.73	7.4	179	215)	213	200	20.2	20,Z	_	20.3	20-3	<u>(∞</u>
Lab control	A	10	10		위/		0 '2		1.1		Ü.2																		100
	В	+					20	 የ	۹.0		a.2	Ø 2	8,22	-185	7.73	-	7.72	7.72	179	217	_	220	200	20.2	20,7		20, i	202	(00
0.1	<u>A</u>	IQ.					رم او ****	·,~	1.0			0-2																	100
	В	II	10	10	H	Y.	0		0.0	-	A	<i>a</i> 2-	8.19	コピア	7.7L		776	2.77	180	200		202	200	70.0	200		20.0	200	100
1.0	A	101					0 1	Q • I	9.2		8.7	© <u>20</u>	D-()																100
	В	0			10/		<i>O</i> 1	<u>ያ</u> ኮ	87	******	G-7	ain	Ŷ 22	748	7.74		776	7.2	187	221		223	20.0	200	20,0	_	20.0	20.4	(00
10	<u>A</u>	12					8 -1	<u>د</u> ر ن	0.7	_	0.2	2,40	20.60	1,5	77		1												(00)
	В		10					0 0	A A	-		76	£.2µ	787	771		7,74	7.15	218	256		261	20.0	20,0	20,0	~	20.0	26.0	(00
100	A	16		10		위	8 · I	8.0	9.0	_	7.2	1/.0	D. 2		11.11			11.17											(00)
	В	(0)	Ó	10	10/	<u>. </u>	0.7	Θ Λ	2 5				9.70	197	7.78	_	7 7	7.5-	550	562		5700	20.0	20.0	20.0	_	19.9	200	loo
1000	A						γ. 5	O P	9.5	_	8.0	10.1	0 . ~	, , , ,	0 11 10			(, 80											100
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Animal Source:	AB	<u>S</u>				<u>.</u>						Date	Rec	eivea	: 142	re c	00.	<u> </u>			-								
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Comments:	0 hrs:	rol	Max	2.17	NOL	W.	tu	ر بار	1751	1	1 0	<u>ays</u>	00	(8)	(N	1114	<u>ا ا ار</u>	<u>0 7 1</u>						ΔМ	EC E	a r th :	and F	inviro	nmental
	24 hrs.					7					· · ·		<u> </u>								• •							r., Sui	
	48 hrs.	R	'd.	<u> </u>	00	8:0	15	· 						·													4 921	-	
	72 hrs.	<u></u>			1.	<u> </u>		·			<u>.</u>												: .			3-904			
<i>:</i>	96 hrs.						_														-		•	(03)	3) 430)-JUT	-1		
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QA Check:	<u>B</u>	5 1	<i>U0</i>	2/6	۲_		-					Fi	ial Re	eview	· A	``	<u> vut</u>	<u>υ</u> 5			-								

	· 			Acute Fish Test-96	Hr Survival	
Start Date: End Date:	11/27/2002 12/01/2002		Lab ID:	0211-339 AEESD-AMEC Bioassay SD		BEAZER BMSA - Benzene Monosulfonic Acid
Sample Date:	Industrial p			EPAA 93-EPA Acute	Test Species:	PP-Pimephales promelas
Conc-mg/L L-Lab Control	1.0000	1.0000	-	· · · · · · · · · · · · · · · · · · ·	····	
0.1	1.0000	1.0000				
1	1.0000	1.0000				
_ 10	1.0000	1.0000				
100		1.0000				
1000	1.0000	1.0000				

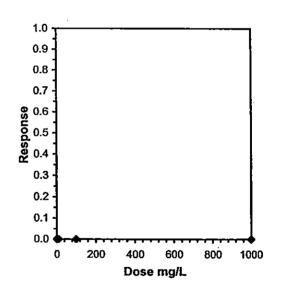
,			_	Tra	ansform:	Arcsin Sc	uare Roof	t	 Isoto	onic
	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	· Mean	N-Mean
L-	Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1,0000	1.0000
	0.1	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
	1	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
	10	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
	100	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000
	1000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	1.0000	1.0000

Auxiliary Tests Statistic Critical Skew Kurt

Normality of the data set cannot be confirmed

Equality of variance cannot be confirmed

Linear Interpolation (200 Resamples) Point mg/L SD 95% CL(Exp) Skew IC05 >1000 IC10 >1000 IC15 >1000 IC20 >1000 IC25 >1000 IC40 >1000 IC50 >1000

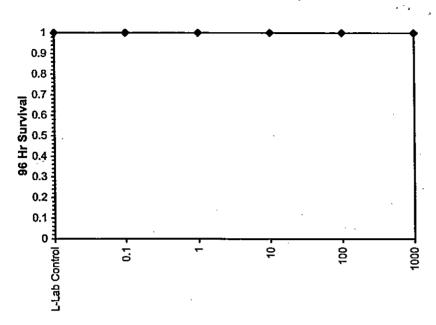


Acute Fish Test-96 Hr Survival

11/27/2002 Test ID: 0211-339 Sample ID: BEAZER

12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMSA - Benzene Monosulfonic Acid Protocol: EPAA 93-EPA Acute Test Species: PP-Pimephales promelas

Dose-Response Plot



Start Date:

End Date:

Sample Date:

Industrial product testing

Comments:

Freshwater 96-hr Acute with Renewal

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Sample ID;	BL92 PSA	xp	<u>-</u>			_									End	Date	& T	ime:	1/2/1	10	2		320				-		
Contact: Test #:	02	11 -	33	37		1			<u> </u>						1	Test C	organ Prote	ocol:	EP/	- 19	95	Tr/	7 op!	r 5	1996	·			
			<u>.</u>	~.	٠. ي				D.	<u> </u>			<u> </u>		pF					ondu	ctivit	y		Test	Tem	perat	ure		
Concentration			Nııı	mber	r of				(mg					((pH u				_ (μmho	s-cm)			<u>(°(</u>				%
mall	Rep	T.i		Orga		ıs		l	Init.						Init.	Fin.				Init.					Init.				Surv.
11817	Кор	_		48		_	0	24	48	48	72	96	0	24	48	48	72	96	0_	48	48	96	0	24	48	48	72	96	
lab control	A						8.2	8.1	7,8	-	8,4	8.5	804	7.90	7.75	ı	7.73	7.74	178	226	277	22)	20,0	20,0	20.2	ر.	20,3	70,2	100
VIN WITH	B	J. L		(0)																				_			_		100
0.1	A			8	Ø	В	8.0	8.0	7.5		1,3	8,0	8.04	743	7.73		7.65	2.77	179	209	مسر	215	20.0	70,0	20,2	200000000	Z0,1	20-2	100
<u> </u>	В	10	10	10																				2	_		20.1	1	100
1.0	A	10	ũ	10	10	0	8.0	8.0	7.4		7.4	8.2	8.03	1.92	7.75		7.64	7.76	79	208		213	20,0	10.0	20.2		۱۰۰۵	23.7	(00)
	В	10	0	Ü	10	10													40.				2	2	200		20.1		100.
10	A	10	10	10	10	10	8.0	81	7.4	_	7.7	33	8.01	17.43	7.78		7.46	7.72	180	רסו	} <i>-</i> -	2(2	20,0	A0-0	20.2	_	۳۰۱	202	(00
	В			Ö																226				200			74.0	4.7	
100	A	10	10	(0	10	10	8.0	8.1	9.0	-	7.9	80	7.83	195	7,81		7,70	7.68	208	140		227	20.0	20.0	20.1		20.0	20.3	100
	В	10	lo	(0)	10	/0													./-					h . ^	72		-	**********	100
1000	A						8.1	8.2	9:1	-	8.1	8,2	7.43	77.91	7.84		T.80	7.87	454	467	-	14/5	20.0	120.0	20.0		Δ),	200	100
	В	10	10	(0	10	10																	ю.			300 83000	383333		100
	Α								1000000		a contra		! 2 300000	S (2000)		20000000		3000000		2000000			2						
	В		1																					400000			3800000	20000000	
Technician Ir	nitials	MD	At	Mp	<u></u>	Rb					:																	•	•
Animal Source:	_ABS			· · ·		÷-	_								: <u> </u>					<u> </u>	-								
Comments:	0 hrs: 24 hrs.					:			fis)	<u>^</u>	11 d	ian	p. o	ed	<u> </u>	nrt	19t	<u>เชา</u>			-	•						Enviro er., Sui	nmental
	48 hrs.	<u>f</u>	al	<u>a</u>	0	8	45						<u>.</u>								-				Dieg				ic D
	72 hrs.	7						. :					Ė.								<u>-</u>				8) 451			, es I	
	96 lırs.					· .						<u> </u>		·				·			-			(6)	aj 43	J-7U4	T		
OA Check	3.CS	17/	07.	107		٠.						Fir	nal Re	eview		1 2_	414	03			_								•

				Acute Fish Test-96	Hr Survival	
Start Date:	11/27/2002		Test ID:	0211-337	Sample ID:	BEAZER
End Date:	12/01/2002	2	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	PSA - P-Phenot Sulfonic Acid
Sample Date:			Protocol:	EPAA 93-EPA Acute	Test Species:	PP-Pimephales promelas
Comments:	Industrial	product (testing		• •	• •
Conc-mg/L	1	2				
L-Lab Control	1.0000	1.0000		· · · · · · · · · · · · · · · · · · ·		
0.1	0.8000	1.0000				
1	1.0000	1.0000				•
10	1.0000	1.0000				
100	1.0000	1.0000				
1000	1.0000	1.0000			•	

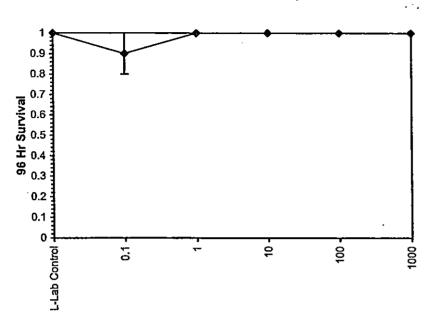
Transform: Arcsin Square Root									Isoto	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	-	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2		1.0000	1.0000
0.1	0.9000	0.9000	1.2596	1.1071	1.4120	17.115	2		0.9800	0.9800
1	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	-	0.9800	0.9800
10	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2		0.9800	0.9800
100	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2		0.9800	0.9800
1000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	•	0.9800	0.9800

Auxiliary 1	Tests				Statistic	Critical	Skew	Kurt
	of the data set o	annot b	e confirmed			,		
	variance canno							
				ar Interpolation	on (200 Resamples)			
Point	mg/L	SD	95% CL(Exp)	Skew				
IC05	>1000							
C10	>1000							
IC15	>1000				1.0			
C20	>1000				-		·	
C25	>1000				0.9			
C40	>1000		•		0.8 -		ł	
C50	>1000				0.7			
							1	
					<u>8</u> 0.6 -		1	
				•	8esbouse 0.5 -	•	ļ	
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					0.3 -		i	
			•		0.2			
		-						
					0.1			
					0.0			
				٠.		200 400 600	800 1000	

Dose mg/L

Acute Fish Test-96 Hr Survival Start Date: 11/27/2002 Test ID: 0211-337 BEAZER Sample ID: End Date: Lab ID: AEESD-AMEC Bioassay SD Sample Type: 12/01/2002 PSA - P-Phenol Sulfonic Acid ample Date: Protocol: EPAA 93-EPA Acute **Test Species:** PP-Pimephales promelas omments: Industrial product testing





Hyalella azteca

		~~ 1			Renewal	
T	+	(14 6-	A ante	7771TM	PANAMI	

96 Hour Toxicity Test Data Sheet - AMEC Broassay Laboratory

Client:	Beazer	Start Date & Time: 1/27 57 1736
Sample ID: Contact:	BMDSA	End Date & Time: 1648 Test Organism: H. 92CC
Test #:	02[1-34]	Test Protocol: ATTM 1994, EPA OPPTS 1996

								<u> </u>	D.	0.	-		<u> </u>		p	H				Condu	ctivi	ty		Tes	t Tem	-	ture		
Concentration			Ν̈́υ	ımbe	r of					z/L)				((p <u>H</u> ı	ınits)_	_		(μmho	s-cm	1)	<u> </u>			<u>C)</u>			%
male	Rep	ĺτ.		Orga]		Fin.					Init.	Fin.				Init.	Fin.	<u> </u>		<u> </u>	Init.	Fin.	ļ		Surv.
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Lab cont.	Ā	10		 		8			8.4	-	8.6	8.6	8.05	79	7,8	1-	7.%	7.77	182	184	1	185	20.0	205	20,5		20,4	20.5	80_
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 -	В	10	<u> </u>	├-	┼\	17			12.2.5 11						1											(4)			100
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Technician In	itials	56				<u>I</u>	<u> </u>																						

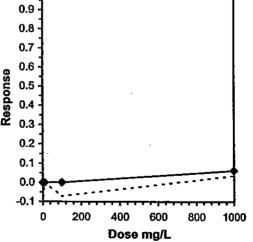
Animal Source:	AB	Date Received: U 74 07	
Comments:	0 hrs: 24 hrs. 48 hrs. 72 hrs. 96 hrs.	rangefinder test, 9-12 days old @ initiation	AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044
QA Check:	Bes	12/02/02 Final Review: 4 14/03	

			А	mphipod 96-Hr Survival Bio	assay-96 Hr Su	rvival
Start Date: End Date: Sample Date: Comments:	11/27/2002 12/01/2002 Industrial	2	Test ID: Lab ID: Protocol:	0211-341 AEESD-AMEC Bioassay SD ASTM 94	Sample ID:	BEAZER BMDSA - Benzene Metadisulfonic Acid HA-Hyalella azteca
Conc-mg/L	1	2	3		 -	
L-Lab Control		1.0000	1.0000			
0.1 1	1.0000 1.0000	0.8000				
10	1.0000	1.0000	0.8000	•		
100	1.0000	1.0000	1.0000			
1000	0.8000	0.9000	1.0000			

		_	Tra	Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean	
L-Lab Control	0.9333	1.0000	1.3104	1.1071	1.4120	13.432	3				0.9600	1.0000	
0.1	0.9333	1.0000	1.3104	1.1071	1.4120	13.432	3	0.000	2.500	0.2841	0.9600	1.0000	
1	1.0000	1.0714	1.4145	1.4120	1.4195	0.304	3	-0.916	2,500	0.2841	0.9600	1.0000	
10	0.9333	1.0000	1.3104	1.1071	1.4120	13.432	3	0.000	2.500	0.2841	0.9600	1.0000	
100	1.0000	1.0714	1.4120	1.4120	1.4120	0.000	3	-0.894	2.500	0.2841	0.9600	1.0000	
1000	0.9000	0.9643	1.2561	1.1071	1.4120	12.145	3	0.478	2.500	0.2841	0.9000	0.9375	

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	-normal dis	stribution (p <= 0.01)		0.84021		0.858		-0.7615	-0.5454
Equality of variance cannot be co	nfirmed		_							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000	-		0.20204	0.21638	0.01218	0.01937	0.68171	5, 12

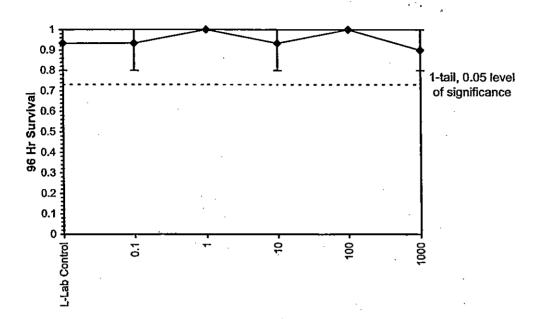
Linear Interpolation (200 Resamples)										
Point	mg/L	SD	95% CL(Exp)	Skew						
IC05	820,00					<u> </u>				
IC10	>1000					•				
IC15	>1000				1.0					
IC20	>1000				4					
1C25	>1000				0.9					
IC40	>1000			•	0.8 -					
IC50	>1000			*	0.7 -					
					0.6	<u> </u>				
				•	g ^{v.} °]					
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					8 0.5 1 0.4 1 0.3 1					
					₽ _{0.3} :	1				



Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Test ID: 0211-341 Sample ID: BEAZER
Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMDSA - Benzene Metadisulfonic Acid
Protocol: ASTM 94 Test Species: HA-Hyalella azteca

Dose-Response Plot



11/27/2002

12/01/2002

Industrial product testing

Start Date:

End Date:

Sample Date:

Comments:

Freshwater	96-hr	Acute	with	Renewal
I I CSII Walci	20-111	Acuto	AAICEI	I COTTO AL CIT

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Freshwater 90	_			COHO	swa	1				,	Hour	10.	Alcity	, 16,	•		0.7	,,		221			330		•				
Client	·	12/	R-			-				-							te & T te & T			2/11			30,						
Sample ID		<u>lS</u>	١							-	•						Organ				<u>icu</u>		163		-				
Contact Test #		1-	24	7						-							t Prote					OPP		1996					•
1 est #	001	<u> </u>		0						-						100				· · · · <u> </u>		<u> </u>	<u>' / </u>					-	
·	Ţ	Τ							D.	Ο.	_		<u> </u>	·	pl	H			T-7	Cond	uctivi	ity		Tes	t Tem		ure		
Concentration			Nu	mbe	rof				(mį	g/L)				1	(pH u	mits)				(µmh	os-cn			,		<u>C)</u>		-	%
mall	Rep	L	ive	Orga	ıni <u>s</u> r	ns			Init.	Fin.	,]				Init.	Fin.	<u> </u>			Init.	-	_		<u> </u>	-	Fin.		<u> </u>	Surv.
.		0	24	48	72	96		24	48	48		96	0	24	48	48	72	96	0	48	48		0	24	48	48	72	96	
Lab cont.	A	Ю				8	8.2	85	84	_	4.8	86	8,24	788	782	_	7.83	7.71	179	185	<u> </u>	१६५	20:0	20.5	204		20,4	්ටිය. ල	<i>S</i> 00
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(.0	A	10		<u> </u>		10	8-1	ð. i	8.5		8.8	3.1	8.19	799	7.91		7,92	7.89	180	185		186	20.0	704	204		20.4	20.4	(00
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Animal Source:		185					-						Recei								3								
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	72 hrs.	—												_				•			•				Diego			-	
	06 hrs																				•) 458-				

QA Check:

Final Review: ab 1/4/03

			A	mphipod 96-Hr Survival Bio	assay-96 Hr Surv	rival
Start Date: End Date: Sample Date:	11/27 <u>/</u> 2002 12/01/2002		Lab ID:	0211-342 AEESD-AMEC Bioassay SD ASTM 94	Sample ID: Sample Type: Test Species:	BEAZER BMSA - Benzene Monosulfonic Acid HA-Hyalella azteca
Comments:	Industrial p	roduct				· · · · · · · · · · · · · · · · · · ·
Conc-mg/L	1	2	3	-		
L-Lab Control	0.8000	1.0000	1.0000			
0.1	0.9000	1.0000	1.0000	ı		
1	1.0000	1.0000	1.0000	1		
10	0.8000	1.0000	0.9000	l .		
100	0.9000	1.0000	1.0000	(
1000	0.8000	1.0000	1.0000	ı		

				Tra	ansform:	Arcsin Sq	uare Root	<u> </u>		1-Tailed		Isot	onic
	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%_	N	t-Stat	Critical	MSD	Mean	N-Mean
Γ.	L-Lab Control	0.9333	1.0000	1.3104	1.1071	1.4120	13.432	3		-		0.9667	1.0000
	0.1	0.9667	1.0357	1.3577	1.2490	1.4120	6.930	3	-0.441	2.500	0.2684	0.9667	1.0000
٠.	1	1.0000	1.0714	1.4145	1.4120	1.4195	0.304	3	-0.970	2.500	0.2684	0.9667	1.0000
_	10	0.9000	0.9643	1.2561	1.1071	1.4120	12.145	3	0.506	2.500	0.2684	0.9341	0.9663
f ·	100	0.9667	1.0357	1.3577	1.2490	1.4120	6.930	3	-0.441	2.500	0.2684	0.9341	0.9663
L	1000	0.9333	1.0000	1.3129	1.1071	1.4195	13.574	3	-0.023	2.500	0.2684	0.9341	0.9663

'	Auxiliary Tests		•			Statistic		Critical		Skew	Kurt
	Shapiro-Wilk's Test indicates nom	nal distribu	ition (p > 0	.01)		0.90278		0.858		-0.6996	-0.6109
3	Bartlett's Test indicates equal vari	ances (p =	0.05)			11.2032		15.0863			
:	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
`, '	Dunnett's Test	1000	>1000			0.18823	0.20159	0.0088	0.01729	0.7643	5, 12

			Line	ear Interpolation	ı (200 Resamples)
Point	mg/L	SD	95% CL(Exp)	Skew	· · · · · · · · · · · · · · · · · · ·
C05	>1000		•		
C10	>1000				
IC15	>1000				1.0
C20	>1000				0.9
C25	>1000				4
C40	>1000				0.8
IC50	>1000				0.7 -
					0.6
					Z 1
					, g 0.5 1
					<mark>중</mark> 0.4 -
					rž 0.3 -
					0.2
					4
					0.1
				•	0.0
					-0.1
					0 200 400 600 800 100
					Dose mg/L
					Dose mg/L

Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Start Date: End Date:

11/27/2002 12/01/2002

Test ID: 0211-342

Lab ID: AEESD-AMEC Bioassay SD Sample Type: Protocol: ASTM 94

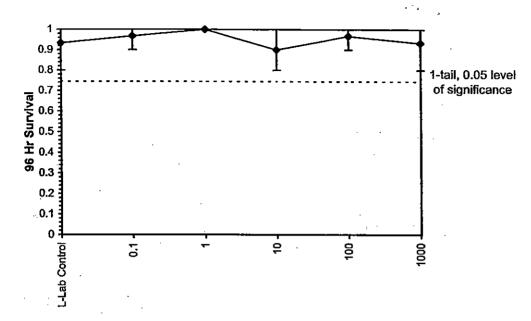
Test Species:

Sample ID:

BEAZER BMSA - Benzene Monosulfonic Acid

HA-Hyalella azteca

Sample Date: Comments: Industrial product testing



Uroch	TTIOTON	06 hr	Acute	with	Renewal
CLESH	IWALCI	フローロ	Acute	willi	T/OIIO M III

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client:	Begzur	Start Date & Time: 1/27/07 1370
Sample ID:	PSA	End Date & Time: 12/1/02 Test Organism: H. 92tl C. W. 11,00
Contact: _ Test #:	07 (1-241)	Test Organism: H. 95ter / 1600 Test Protocol: A4TM 1999 6PPT5 1996
1,651 #	11/11 3/0	

· · · · ·		Γ	· ·			_	_		D.						pI					Condu		_		Tes	Tem		ture		%
Concentration			Nu	mbe	r of				(mg	/L)		,	<u> </u>		pH u		-		۷	μmh		!)		1		<u>C)</u> _	 '		
mg/L	Rep	L	ive	Orga	misn	ns		· _	Init.	Fin.					Init.	Fin.			ļ		Fin.		 	 -		Fin.			Surv.
μ 		0	24	48	72	96	0	24	48	48	72	96	0	24	48	48	72	96	0	48	48	96	0	24	48	48	72	96	<u> </u>
Labcoutrol	Α	10	$\overline{}$			9	8.1	8.3	8.3	1	8.9	8.5	804	7.95	7.89		7,88	8.0(178	144	_	184	20.0	245	209	1874920	20,4	₽0.4	90 (00
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	B	lo	_		· -	10	YY T		7.57°				2							المناسبة	1				11				100
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1.0	A	16		lacksquare	 	10	80	8.5	85	~	8.9	8-5	8.03	7.46	7912	-	7.93	7.96	179	185	_	185	20.0	705	20.4	AL PROPERTY.	20,4	2.5	100
1.0	В	10		1		10																							100
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10	Ā	10		1	-	9	80	86	85		8.9	8.6	8,01	7.97	7,93	1	7,93	292	180	185	_	186	20,0	20.5	20,5	_	20,-1	87.5	90
	B	ĬŌ	_	1	<u> </u>	70																و المناه		10.1					(00
	C	10	-	$\vdash \uparrow$	Ħ	1/2	<u> </u>				57																	國際	(00
100	Ā	lo l			₩-	10	X o	20	8.7		4.8	8.6	783	7.98	797	~	7,98	7.93	208	215	_	SIP	20.0	20.5	20,5		20,4	20.5	(00
	В	ĭo		-	1	10					5.3																		(00
	C	10		┢	1	9																	3		CC.				90
1000	.A	6		\vdash	+	10	D.I	以ユ	タマ	_	8.8	१८८	743	748	7.87		7,90	7.86	454	455	_	416	20.0	205	20,5	_	2011	205	(00
1000 .	B	10		├	H	10	0																						100
		10		├	$\vdash \uparrow$	9				-/-	i.:			1100/02											8				90
Technician In	C itials	76		-	\vdash	龙		فتحدثنا			S. U.S.	18.00	قائديا والما	شد وتعدا:		غندانك تكا	ti like e kini e k	(Colonian)											

Animal Source:	AR	S Date Received: \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
Comments:	0 hrs: \(\) 24 hrs. \(\) 48 hrs. \(\) 72 hrs. \(\) 96 hrs. \(\)	range finder test, 9-12 days old@ initiation	AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044
QA Check:	3 05 (2	final Review: af 1/1/03	

			А	mphipod 96-Hr Survival Bio	assay-96 Hr Sur	vival
Start Date:	11/27/2002	-	Test ID:	0211-340	Sample ID:	BEAZER
End Date:	12/01/2002		Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	PSA - P-Pheno! Sulfonic Acid
Sample Date:			Protocol:	ASTM 94	Test Species:	HA-Hyalella azteca
Comments:	Industrial p	roduct	testing		•	·
Conc-mg/L	1	2	3			
L-Lab Control	0.9000	1.0000	1.0000			·· ·····
0.1	1.0000	1.0000	1.0000			8
1	1.0000	1.0000	1.0000			
10	0.9000	1.0000	1.0000			
100	1.0000	1.0000	0.9000	r		
1000	1.0000	1.0000	0.9000	ı		

		_	Transform: Arcsin Square Root						1-Tailed		Isotonic		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean	
L-Lab Control	0.9667	1.0000	1.3602	1.2490	1.4195	7.081	3				0.9892	1.0000	
0.1	1.0000	1.0345	1.4145	1.4120	1.4195	0.304	3	-0.860	2.500	0.1578	0.9892	1.0000	
1	1.0000	1.0345	1.4145	1.4120	1.4195	0.304	3	-0.860	2.500	0.1578	0.9892	1.0000	
10	0.9667	1.0000	1.3577	1.2490	1.4120	6.930	3	0.039	2.500	0.1578	0.9667	0.9772	
100	0.9667	1.0000	1.3577	1.2490	1.4120	6,930	3	0.039	2.500	0.1578	0.9667	0.9772	
1000	0.9667	1.0000	1.3577	1.2490	1.4120	6.930	3	0.039	2.500	0.1578	0.9667	0.9772	

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal dis	stribution (p <= 0.01)		0.76441		0.858		-0.9438	-0.5893
Bartlett's Test indicates unequal	variances (p	p = 5.22E-	03)		16.6449		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			0.08602	0.08995	0.00253	0.00598	0.82415	5, 12

			Line	ear Interpolation	on (200 Resamples)
Point	mg/L	SD	95% CL(Exp)	Skew	
IC05	>1000				
IC10	>1000				'
IC15	>1000				1.0
IC20	>1000				0.9
IC25	>1000			**	4
IC40	>1000				0.8
IC50	>1000				0.7 -
					0.6
					<u> </u>
					ğ ^{0.5}
					9 0.5 0.5 0.4 9 0.3
					o [∞] 0.3 }
					0.2
				•	0.1
					0.0
					-0.1 1

Dose mg/L

Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Start Date: End Date:

Sample Date:

Comments:

11/27/2002 12/01/2002 Test ID: 0211-340

Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Sample ID:

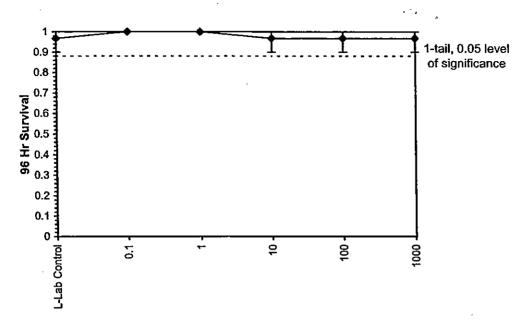
Test Species:

BEAZER

PSA - P-Phenol Sulfonic Acid

HA-Hyalella azteca

Protocol: ASTM 94 Industrial product testing



Chironomus tentans

4.		L.	/ I			
Freshwater	A / 1	A		n.		1
Hrechtijafer	un-nr.	A CHIE	wiin	Κt	TIEWA	
LI COLL WALLO	70-111		44 1 27 1	+ //	711∪ 11 	•

96 Hour Toxicity Test Data Sheet - AMEC Bloassay Laboratory

Olimbe Balla (12	Start Date & Time: 11/27/07 1430
Client: BUSA Sample ID: BMDSA	End Date & Time: 12-1-08 1439
Contact:	Test Organism: C. tentans
Test #: 0211 - 344	Test Protocol: ASTM 1994, EPA OPPTS 1996
1est#. 0011 011	

	· 	l			•		Ī		D.	O.			<u> </u>		pI				1	Condu				Tes	t Ten	-	ture		%
Concentration			Nu	mbe	r of		_		(mį	g/L) _			<u> </u>		(pH u				(μmho	_		-			C)			
mg1L	Rep	ΙL	ive (Orga	nisr	ns			Init.	Fin.		<u>ا</u> .			Init.	Fin.	ļ		<u> </u>	Init.			ļ	<u> </u>	Init.	_	_		Surv.
		-	24	_	_		0	24	48	48	72	96	0	24	48	48	72	96	0	48	48		0	24		48	72	+	
lab wintrol	A	10		· ,	7	6	80	8.0	8.1		8,6	8.4	805	785	7.80		7.82	7.6)	182	194		193	20.0	20.5	20.5		20.4	20.3	<u>(60</u>
	В	0			\Box	4																		أنحينا			100		<u>५०</u> 30
	С	10			Π	3																							
D-1	Α	10			17	18	7.9	8.1	7.9	\prod	8,5	8.4	8.03	7.90	7.78		7.83	7.87	179	189		190	20.0	20:3	20.3	elan resa	25.3	20. Z	80
	В	10			7	G,											665 Q							11		12 (2) 情 (2)			60
	С	10		7		13								, Killian				le sand		المراد المساملة								MARKET THE	80
1.0	A	10				2	7.9	7.7	1.5		8'0	7.9	8.02	7.28	1.73		7.80	7.76	180	141	303 40	194	20,0	20.3	20.3	HER HOS	20:3	Z.J.Z	<u> 20 </u>
	В	10		I		5	(L.		2														1 数据数	50
	С	10				7			[ناد												20.2				70
10	A	(0)		\prod_{-}	,	6	7.8	8.1	8.		8,4	8.4	8.03	1,89	7.79		7.81	7.78	184	191	Ŀ	193	200	203	40.0		20.3	20.2	<u> (60</u>
	В	10		II		4	22		1							ي ال		100					<u> </u>		L				40
	С	0				2,									1.32						2.2			0.7	D/2 7	多種		網絡網	50_
100	A	10				d	7.8	8.4	8.7		8.3	8.3	8.08	7.99	17.89		7,83	700	238	247	-	246	,000	20?	- 2 <i>0</i> ,2		-20.3 Beers	20-1	40
	В	(0)				8															۔۔انہ								80
	С	10	\Box			7					4											دند. دند. دند					30,00		70
1000	Α	10	Π			17	8.0	8.4	8.3		8,5	3.5	8.12	8.0	7.83		7,90	7. <i>51</i>	741	732		700	X0,0	10.2	ניעני.		201	てつむ	70
	В	10	17			15					, i										L	1							80
	С	10	1/			N			ì. 					154									j v						40
Technician In	itials	SIL	/			OR	}			-																			

Animal Source:	ABS	Date Received: \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
Comments:	0 hrs: <u>Yangy</u> f 24 hrs.	indurtist, and to 3pd instan@initiation	AMEC Earth and Environmental
	48 hrs.		5550 Morehouse Dr., Suite B
	72 hrs.		San Diego, CA 92121
	96 hrs.		(858) 458-9044
OA Check:	BCS 12/07/07	Final Review: 46 114 03	

				Chironomus tentans-9	96 Hr Survival	
Start Date:	11/27/2002		Test ID:	0211-344	Sample ID:	BEAZER
End Date:	12/01/2002		Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	BMDSA - Benzene Metadisulfonic Acid
Sample Date:			Protocol:	ASTM 94	Test Species:	CT-Chironomus tentans
Comments:	Industrial p	oroduct o	testing		·	
Conc-mg/L	1	2	3	-		
L-Lab Control	0.7000	0.9000	0.5000	·		<u> </u>
0.1	0.8000	0.6000	0.8000	· ·	•	•
1	0.2000	0.5000	0.7000			
10	0.6000	0.4000	0.5000	1	-	•
100	0.4000	0.8000	0.7000	•		
1000	0.7000	0.8000	0.4000	r [†] .		

		· _	Tra	ansform: /	Arcsin Sc	uare Roo	t		1-Tailed		Isote	onic
Conc-mg/L	Mean.	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.7000	1.0000	1.0085	0.7854	1.2490	23.035	3	•			0.7167	1.0000
0.1	0.7333	1.0476	1.0335	0.8861	1.1071	12.350	3	-0.151	2.500	0.4136	0.7167	1.0000
1	0.4667	0.6667	0.7467	0.4636	0.9912	35.605	3	1.582	2.500	0.4136	0.5583	0.7791
10	0.5000	0.7143	0.7854	0.6847	0.8861	12.819	3 .	1.349	2.500	0.4136	0.5583	0.7791
100	0.6333	0.9048	0.9277	0.6847	1.1071	23.527	3	0.489	2.500	0.4136	0.5583	0.7791
1000	0.6333	0.9048	0.9277	0.6847	1.1071	23.527	3	0.489	2.500	0.4136	0.5583	0.7791

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p > 0).01)		0.92717	;	0.858		-0.3251	-1.0547
Bartlett's Test indicates equal var	iances (p =	0.85)			2.02522	١.,	15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	>1000			0.40171	0.5612	0.04056	0.04106	0.46442	5, 12

	•		Line	ar Interpolati	on (200 Resamples)	
Point	mg/L	SD	95% CL(Exp)	Skew		
IC05	0.3037			······································		
IC10	0.5074					
IC15	0.7111		,		1.0 1 	
IC20	0.9147				0.9	
IC25	>1000				4	
IC40	>1000			•	0.8 -	
IC50	>1000				0.7 -	
	-				0.6	
					% 4.	
					ğ 0.5	
					중 0.4 -]	
					∞ _{0.3}]	
-				:	0.2	
					4 1	
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				•	0.0 🖟	

200

400

Dose mg/L

600

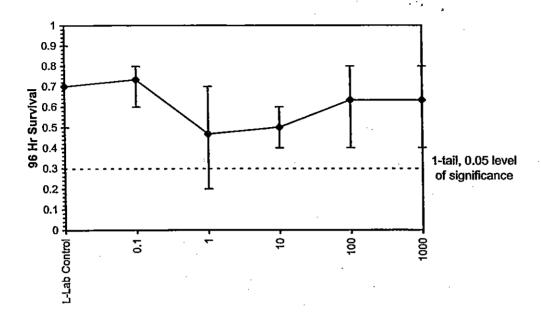
800

Chironomus tentans-96 Hr Survival

Start Date: 11/27/2002 Test ID: 0211-344 Sample ID: BEAZER

End Date: 12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMDSA - Benzene Metadisulfonic Acid CT-Chironomus tentans

Dose-Response Plot



Comments:

Industrial product testing

BCS 12/62/02

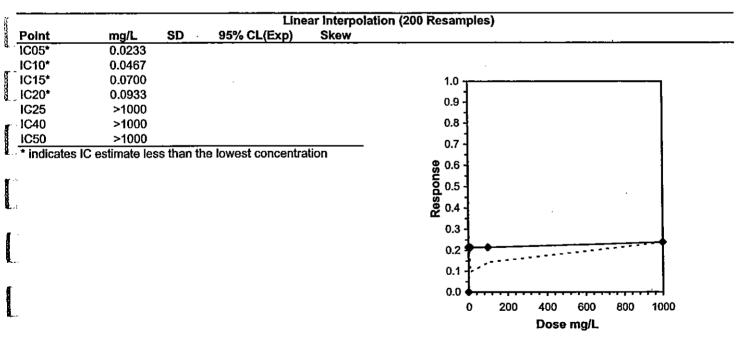
96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Sample ID: Contact: Test #:		17e/r SA 11-				·				 					End	l Dat Γest	e & T e & T Organ t Prote	ime: ism:	\\(\frac{1}{2}\)		nto	ins	1400 EPA	3	TS	1976			
1 est #:	0.0	11	<u>フ</u> ¬																	<u> </u>								—т	
										.O.				,	pH					Condu µmho		-		rest	Temp: °()		ще	l	%
Concentration	_			mbei				η-		ıg/L) t. Fin.			-	1	pH w Init.		·			Init		<u>, </u>			Init.			\neg	Surv.
mgl	Rep			Orga		18 96	0	24		_	72	96	0	24	48	48	72	96	0	48	48	96	0	24		48	-	96	
· · · · · · · · · · · · · · · · · · ·	A	10	24	40	į				28.					1.42					_	194				_	204		25/3	20.3	40
ab Cont.	B	10			\forall	1/																							60
	C	10			1	5																av							50_
0.1	Ā	10			7	4	8.2	8.	4 8.4	1	8.8	8.60	8.27	7.04	7.82		7.84	7.82	179	189	-0.00	(1)	20.0	203	213	राज्यकार है।	20.3	20 2 302350	40 50
· · ·	В	10	-		/	5										*												222	<u> 50 </u>
	С	10			/ -	5															翻譯			333					50
.0	Α	lD				M ا	8.1	8.	٦ 8.	[8.5	8.3	8-19	796	7.82	कल्य कर	783	7.81	180	188	265458	19 26 Mars	20,0	なが地	203	SEE VE	20.1	20,2	30
	В	(D		\perp	<u> </u>	5																						3000	<u> </u>
	С	10		_/_		7												720-	LO.	100			7	20.2	20.7	1884 PA		4.2	76 50
0	Α	10				5,	8.1	8	38.	4 [8.7	8.5	8.23	7.5%	1.67	esta est	7.80	/.DZ	(<u>)</u> (192	\$18 FE	YS	20.0	(A) (A)	20·Z		Z0.1	Z 0. Z	20 20
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	В	10				+			80 B/G															100					50
	C	10	+		-	2	3						Q 20	2 00	791	1385 188	- 01	2 (3)	550	257	7.623 GR	5 C C	240	202	20.	1501 SY	20.0	20.0	70
1000	<u>A</u>	0	\bot			 	<u>د لا ا</u>	7 () .	48.4		6.9	9.0	8.6	000	7,70		100	7-7)		23		MARK							40
	<u>B</u>	10	1-	_	-	5		建筑						26.0	**************************************	2 b						100							50
		17			_	BK	586	3				1818		15705			12.57	42000	Section 2		assies:	Spino	T CONTROLS	elecced-secti	N BONNESS OF STREET	[420] 223	C PARTIES	10/23/5-21	
Technician In	itials	7				FAZY	Į																						
nimal Source:	A						•							eived:							•								
omments:	0 hrs: 24 hrs. 48 hrs.									Zna									atio					555	0 Mor	ehou	ıse Dr	., Suit	mental e B
	72 hrs.		_	_			_																		-		\ 9212	11	
	96 hrs.																				•			(858	3) 458	-904	+4		•
															\sim											•			

				Chironomus tentans-	6 Hr Survival	
Start Date:	11/27/2002	2 .	Test ID:	0211-345	Sample ID:	BEAZER
End Date:	12/01/2002	2	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	BMDSA - Benzene Monosulfonic Acid
Sample Date:			Protocol:	ASTM 94	Test Species:	CT-Chironomus tentans
Comments:	Industrial	product :	testing			
Conc-mg/L	1	2	3			
L-Lab Control	0.7000	0.9000	0.5000			
0.1	0.4000	0.5000	0.5000		•	•
1	0.3000	0.5000	0.7000			
10	0.5000	0.8000	0.6000			
100	0.6000	0.7000	0.5000			
1000	0.4000	0.7000	0.5000			

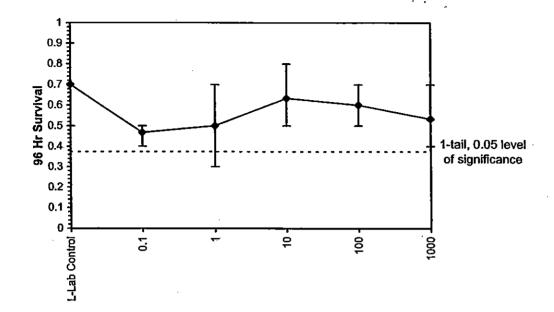
			_ Tra	ansform:	Arcsin Sc	uare Root	_		1-Tailed		Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.7000	1.0000	1.0085	0.7854	1.2490	23.035	3				0.7000	1.0000
0.1	0.4667	0.6667	0.7518	0.6847	0.7854	7.731	3	1.915	2.500	0.3352	0.5500	0.7857
1	0.5000	0.7143	0.7854	0.5796	0.9912	26.198	3	1.664	2.500	0.3352	0.5500	0.7857
10	0.6333	0.9048	0.9262	0.7854	1.1071	17.770	3	0.614	2.500	0.3352	0.5500	0.7857
100	0.6000	0.8571	0.8875	0.7854	0.9912	11.592	3	0.902	2.500	0.3352	0.5500	0.7857
1000	0.5333	0.7619	0.8204	0.6847	0.9912	19.038	3	1.403	2.500	0.3352	0.5333	0.7619

	Auxiliary Tests					Statistic		Critical		Skew	Kurt
	Shapiro-Wilk's Test indicates norr	nal distribu	ition (p > 0	.01)		0.96084		0.858		0.20468	-0.762
F	Bartlett's Test indicates equal vari	ances (p =	0.66)			3.28406		15.0863			
1	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TÜ	MSDu	MSDp	MSB	MSE	F-Prob	df
L	Dunnett's Test	1000	>1000			0.32689	0.45667	0.02758	0.02696	0.44655	5, 12



Chironomus tentans-96 Hr Survival Start Date: 11/27/2002 Test ID: 0211-345 Sample ID: BEAZER End Date: 12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: BMDSA - Benzene Monosulfonic Acid Protocol: ASTM 94 Test Species: Sample Date: CT-Chironomus tentans Comments: Industrial product testing

Dose-Response Plot



Freshwater 96-hr Acute with R	}enowe lA\
-------------------------------	-----------------------

Client:	Begzer	Start Date & Time: 11/27 07 1530
Sample ID:	PSA	End Date & Time: 12/102 1445
Contact:	21. 242	Test Organism: 1 tentans Test Protocol: Man 1994, Tepa oppro 1996
Test #: _	N2/1-343	Test Holocol. Man of the annual control of the cont

		Γ.					1		D.	Ö.					pΙ	I				ondu	ctivi	ty		Tes	t Ten	pera	ture		
Concentration			Ν'n	mbei	r of				(mg				l		(pH u	nits)				μmho	os-cn	1)		_		<u>`C)</u>			%
mall	Rep	I T		Orga				1		Fin.	Ţ			<u> </u>	Init.	Fin.				Init.	Fn.	ŀ	<u> </u>	<u> </u>		Fin.	 -	\perp	Surv.
1181C	Ttop	0			_	96	0	24	48	48	72	96	0	24	48	48	72	96	0	48	48	96	0_	24	48	48	72	96	
lab cont.		10	-			7	8.1	8.4	84	9	8.8	8.7	8.04	7.90	7.85		780	7.84	178	202	20	202	20.0	205	70.4		28.3	204	70
rae conti	В	(0			 	9			(i)			. Ž																	90
 	c	0		_	1	12			10 TX			1.5.	F12																50
01	A	10			1	1	8.0	8. ¥	84		8.7	35	804	796	786		7.88	7.87	179	196		199	20.0	20 H	70 H		20,3	20.3	60
01	В	10	-		 	4																							40
	C	10		-	/	6																							60
1.0		10	-	 	-	2	8.0	2.5	8.4		8.7	8.6	8,03	7.48	7.85	-	791	1.86	179	191	}	194	20.0	20.	20.7		20.1	20.3	30
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	C	10		1	-	3					31	177							17.7										30
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	В			₩	-	12]]					1	3															40
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Technician In	itials	77	<u> </u>	<u>L.</u>		ρĻ	J																•						

Animal Source:	AR	>		Date Received	1: 11/24/02	
Comments:	0 hrs: 24 hrs.	range finder	test, and	to 30rd insta	n @ Instratio	<u>~</u>
	48 hrs. 72 hrs.			<u> </u>		
	96 hrs.			· · · · · · · · · · · · · · · · · · ·		
QA Check:	BCG	12/62/02		Final Review	1: 4 114/03	

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

				Chironomus tentans-9	96 Hr Survival	
Start Date:	11/27/2002	-	Test ID:	0211-343	Sample ID:	BEAZER
End Date:	12/01/2002	2	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	PSA - P-Phenol Sulfonic Acid
Sample Date:			Protocol:	ASTM 94	Test Species:	CT-Chironomus tentans
Comments:	Industrial p	product 1	testing			
Conc-mg/L	1 _	2	3			
L-Lab Control	0.7000	0.9000	0.5000	•		
0.1	0.6000	0.4000	0.6000			
1	0.3000	0.2000	0.3000			
10	0.5000	0.6000	0.4000			
100	0.3000	0.5000	0.5000			
1000	0.3000	0.7000	0.4000			

		_	Tra	ansform:	Arcsin Sc	uare Roo	t	_	1-Talled		Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N_	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.7000	.1.0000	1.0085	0.7854	1.2490	23.035	3				0.7000	1.0000
0.1	0.5333	0.7619	0.8190	0.6847	0.8861	14.195	3	1.510	2.500	0.3139	0.5333	0.7619
*1	0.2667	0.3810	0.5410	0.4636	0.5796	12.379	3	3.723	2.500	0.3139	0.4167	0.5952
10	0.5000	0.7143	0.7854	0.6847	0.8861	12.819	3	1.777	2.500	0.3139	0.4167	0.5952
100	0.4333	0.6190	0.7168	0.5796	0.7854	16.573	3	2.323	2.500	0.3139	0.4167	0.5952
1000	0.4667	0.6667	0.7518	0.5796	0.9912	28.438	3	2.044	2.500	0.3139	0.4167	0.5952

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	ition (p >	0.01)		0.95638		0.858		0.21465	-0.3012
Bartlett's Test indicates equal var	iances (p =	0.62)			3.52142		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤŲ	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	0.1	1	0.31623		0.30612	0.42766	0.06909	0.02366	0.05952	5, 12

				•	ion (200 Resamples)
Point	mg/L	SD	95% CL(Exp)	Skew	
IC05*	0.0210	0.0726	0.0008 0.5615	3.5386	
1C10*	0.0420	0.1481	0.0015 0.9429	2.3283	
IC15*	0.0630				1.0
IC20*	0.0840				ا م
IC25	0.1643				0.9
IC40	0.9743				0.8 -
IC50	>1000		,		0.7

^{0.9 - 0.8 - 0.7 - 0.6 - 0.5 - 0.5 - 0.4 - 0.3 - 0.2 - 0.1 - 0.0 - 0 200 400 600 800 1000 -} Dose mg/L

Chironomus tentans-96 Hr Survival Sample ID:

11/27/2002

Start Date:

End Date:

12/01/2002

Test ID: 0211-343

Lab ID: AEESD-AMEC Bioassay SD Sample Type: Protocol: ASTM 94

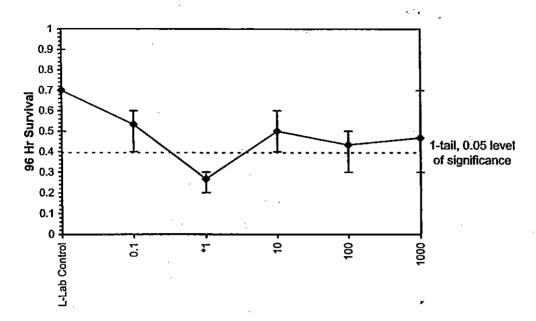
Test Species:

BEAZER

PSA - P-Phenol Sulfonic Acid CT-Chironomus tentans

Sample Date: Comments: Industrial product testing

Dose-Response Plot



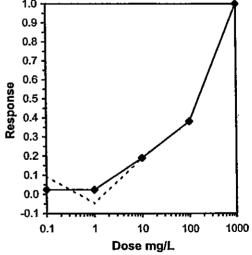
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Contact: Test #:	021	11	34	6		-				• •										TM			€DA	oPP	T\$	1996				į,
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Technician In	itials	ļ	<u> </u>	<u> </u>	L	RV)																							
Animal Source:	AR	25					_								<u> 11</u>						-									
Comments:	0 hrs: 24 hrs.	<u>ra</u>	N	γ.	fir	rd	er	t	ist	, In	<u>d</u>	D 27	red	Ins	stan	<u>@</u>	MI	ita	ħδ	Υ)_	- -								mental	
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	96 hrs.						_		· ·			· ·									•			(030	,, 450	707	•			
QA Check:	865	r-/a	: -21	_{ወጉ}			_					Fin	al Re	view	A	2 1	141.	83			•									

Start Date: 11/27/2002 Test ID: 0211-346 Sample ID: BEAZER End Date: 12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: RES - Resorcinol Sample Date: Protocol: ASTM 94 Test Species: CT-Chironomus tentans Comments: Industrial product testing Industrial product testing CT-Chironomus tentans L-Lab Control 0.7000 0.9000 0.5000 0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000					Chironomus tentans-	6 Hr Survival	
Sample Date: Protocol: ASTM 94 Test Species: CT-Chironomus tentans Comments: Industrial product testing Conc-mg/L 1 2 3 L-Lab Control 0.7000 0.9000 0.5000 0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	Start Date:	11/27/2002		Test ID:			BEAZER
Comments: Industrial product testing Conc-mg/L 1 2 3 L-Lab Control 0.7000 0.9000 0.5000 0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	End Date:	12/01/2002	!	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	RES - Resorcinol
Conc-mg/L 1 2 3 L-Lab Control 0.7000 0.9000 0.5000 0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	Sample Date:			Protocol:	ASTM 94	Test Species:	CT-Chîronomus tentans
L-Lab Control 0.7000 0.9000 0.5000 0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	Comments:	Industrial p	product t	testing			
0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	Conc-mg/L	1	2	3			
0.1 0.6000 0.8000 0.5000 1 0.9000 0.7000 0.6000 10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	L-Lab Control	0.7000	0.9000	0.5000	1		-
10 0.5000 0.7000 0.5000 100 0.6000 0.5000 0.2000	0.1	0.6000	0.8000	0.5000	l e		٥
100 0.6000 0.5000 0.2000	1	0.9000	0.7000	0.6000	•		
•••	10	0.5000	0.7000	0.5000	•		
1000 0.0000 0.0000 0.0000	100	0.6000	0.5000	0.2000)		
1000 0.0000 0.0000	1000	0.0000	0.0000	0.0000	1		

				Tra	ansform:	Arcsin Sc	uare Root	t.		1-Tailed		Number	Total
•	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
	L-Lab Control	0.7000	1.0000	1.0085	0.7854	1.2490	23.035	3				9	30
	0.1	0.6333	0.9048	0.9262	0.7854	1.1071	17.770	3	0.584	2.500	0.3523	11	30
L	1	0.7333	1.0476	1.0421	0.8861	1.2490	17.922	3	-0.238	2.500	0.3523	8	30
	10	0.5667	0.8095	0.8540	0.7854	0.9912	13.911	3	1.097	2.500	0.3523	13	30
۲,	100	0.4333	0.6190	0.7117	0.4636	0.8861	31.002	3	2.106	2.500	0.3523	17	30
ŀ	*1000	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	6.030	2.500	0.3523	30	30

١	Auxillary Tests					Statistic		Critical		Skew	Kurt
	Shapiro-Wilk's Test indicates norm	nal distribu	ition (p >	0.01)		0.95655		0.858		0.06885	-0.7945
Ø	Equality of variance cannot be con	firmed									
Š	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
k	Dunnett's Test	100	1000	316.228		0.34355	0.47994	0.32296	0.02979	4.0E-04	5, 12

ß					Trimmed Spearman-Karber
∄ . –	Trim Level	EC50	95%	CL	·
2	0.0%			-	
	5.0%	91.82	51.32	164.26	
<u>g</u>	10.0%	102.13	54.66	190.85	1.0 -
Contractory (20.0%	123.92	62.03	247.53	0.9
_	Auto-2.4%	86.69	49.76	151.04	
. -					0.8



Chironomus tentans-96 Hr Survival

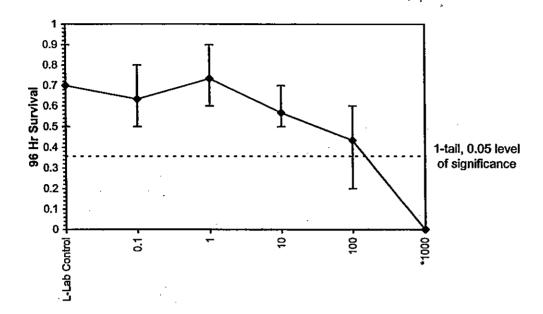
Start Date: 11/27/2002 Test ID: 0211-346 Sample ID: BEAZER

End Date: 12/01/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: RES - Resorcinol

Sample Date: Protocol: ASTM 94 Test Species: CT-Chironomus tentans

Comments: Industrial product testing

Dose-Response Plot



Oncorhynchus mykiss

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Amec-Beazer Range finder	Start Date & Time: 1/29/03 1600	
Sample ID: BMDSA	End Date & Time: 7-7-03 1210	
Contact: Bill Man	Test Organism O. my kiss	
Test #: 0301-104	Test Protocol; <u>EOA-1993</u>	_

Compositestion	oncentration Number of				Ī	Dissol	ved	Oxve	en			рH		,		Co	nduc	tivity		ļ	Ten	npera	iture					
w/L	D				nisms				[mg/]			1	(n	H un	its)			(µ	ımhos	s-cm)				(°C)	ı		Perc.	1
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LC	A	5	5	7	5	\$	9,6	6.5	10.0	7.2	7.1	0.01	(1.1.4	1 / 2 B	7.36	<u> </u>	700	166	10 /	160	سي	17.0	7.					1
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	<u></u>	<u> </u>	5	5	5_	5																					100	٦
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Technician In	itials	54	MD	JK	Sik	OF																						

Animal Source	e: Thomas	Date Received: 1/28/03
Comments:	0 hrs: 24 hrs. 48 hrs. 72 hrs. 96 hrs.	
	, '	·

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

QA Check:

Final Review:

2/10/03

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

O!!+	A Rocce	Range finder	Start Date & Time:	1/29/03	1600
Client: _ Sample ID:	Amec-Beater BMDSA	- Tourse	End Date & Time:	2.2-03	1210
Contact:	Bill Also		Test Organism:	O. mykiss	<u> </u>
Test #:	0301-104		Test Protocol:	EPA 1993	

<u> </u>	Concentration Number of						ī)issol	ved ()xvge	en			pН				Co	onduc	tivity			Ten	npera	ture		
Concentration w/L	D				nisms		_		mg/L			ļ	(n)	H uni	ts)			()	ımhos	-cm)				(°C)			Perc.
\	Rep	2.00.00000000000000000000000000000000	Live	Oigai	***************************************				80000000	''' Nama	6720		387S	// Q	70	0.6	. 6	94	48	72	96	0	24	48	72	96	Surv.
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500	\mathbf{A}^{\cdot}	5	క	4	5	\$	9.2	6.7	9.6	7.3	140	B, 26	7.60	756	1.45	<i>4.</i> 97	762	-(00	760	303	200	23.0	7.5. (10		7	
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Technician In		SH		JR	ゴル	BR		·																	,		

Animal Source	Thoma	J	Date Rece	eived: 1/28/03	
Comments:	0 hrs: 24 hrs. 48 hrs. 72 hrs. 96 hrs.				AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044
QA Check:	, U	2/9/03	Final Review	: BCS 2/10/03	· ·

HTOC	hwater	ACII	re.

Client: Amer - Beazer Range Finder	Start Date & Time: 1/25/07 1600
Choire.	End Date & Time: 2-1-03 1210
Sample ID: BMDSA Contact: Bill Alase	Test Organism: O. mykiss
Test #: #201-104	Test Protocol: <u>EPA (993</u>

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	B	ļ			<u> </u>	 			-																		1	
	C			<u> </u>	<u> </u>																							
	D	ļ			ļ																4	at seed of		(1000000)	46000000	*** E3335333		
Technician In	itials	5 H	MO	JR	SH	BR																				>		

Animal Source	e: Thomas	Date Received: 1/20/03
Comments:	0 hrs:24 hrs.	
	48 hrs.	
	72 hrs.	
	96 hrs.	

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

QA Check:

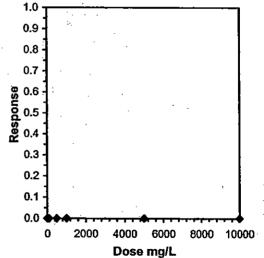
Final Review: BCS 2/10/03

	Acute Fish Test-96 Hr Survival									
Start Date:	01/29/2003	3 -	Test ID:	0301-104	Sample ID:	BEAZER				
End Date:	02/02/2003	3	Lab ID:		Sample Type:	OTH-Other sample type				
Sample Date:			Protocol:	EPAA 91-EPA Acute	Test Species:	OM-Oncorhynchus mykiss				
Comments:	Chemical	testing -	BMDSA Ra	angefinder	•	,				
Conc-mg/L	1	2	3	4						
L-Lab Control	1.0000	1.0000	1.0000	1.0000						
10	1.0000	1.0000	1.0000	1.0000		•				
100	1.0000	1.0000	1.0000	1.0000						
500	1.0000	1.0000	1.0000	1.0000						
1000	1.0000	1.0000	1.0000	1.0000						
5000	1.0000	1.0000	1.0000	1.0000						
10000	1.0000	1.0000	1.0000	1.0000		•				

		_	Tra	ansform: .	Arcsin Sc	uare Root	1	Rank	1-Tailed	Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	_ Sum	Critical	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			1.0000	1.0000
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distrib	ution (p > 0	1.01)		1	0.896		
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	10000	>10000		-		-		

Point	mg/L	SD	95% CL(Exp)	ear Interpolation (200 Resamples) Skew
IC05	>10000			
IC10	>10000		•	
IC15	>10000			1.0
IC20	>10000			
IC25	>10000			0.9 1
IC40	>10000			0.8
1C50	>10000			



	_	
Free	hwater	Acute

Client: Amec - Beaze Rongefinder	Start Date & Time: 1/29/03 1600
Sample ID: BM54	End Date & Time: 1-7:03 12:0
Contact: Bul Alson	Test Organism: O. my Kirs Test Protocol: EDA 1993
Test #: 0301-103	Test Protocol: EPA 1993

Concentration			Nu	ımber	of		I	Dissolved Oxygen						pН					nduc	•			Ter	nper	ature		D
m/L	Rep		Live	Orgai	nisms			(mg/L	<i>,</i>)			_(pI	I uni	ts)			(μ	mhos	addinos vis	and some	15500000000000000000000000000000000000		(°C) ::::::::::::::::::::::::::::::::::::	30 pos t 2000	Perc.
	Пор		24	48	72	96	0	363	12	**	96	0	24	48	72	96	Ø	24	48	72	96	112	24				Surv.
LC	A	5	5	5	5	8	9.6	6.5	10.2	7,7	810	8.10	7.56	7.40	7.39	707	185	16Z	188	160	143	15:2	13.8	13.c	134	13,1	100
	В	<	5	5	5	~																100					100
	c	5	S	5	6	5															ļ						100
	D	5	5	7	5																16 -	7/6				- 7	100
10	A	5	S	5	5	5	9.6	6.7	10.7	7.5	7.4	817	7.50	7.41	7.40	7-16	189	164	192	161	162	6 کوکل	13.6	/3,4	137	2.7	
	В	5	5	5	5_	5															ļ	10,0			-		100
	С	3	5	5	.5	5																					100
· · · · · ·	D	5	5_	4	5	5										-					1.46	3.6		13		10 1	100
100	A	3	5	4	5	5	9.6	6.8	10.4	7.7	7,8	8,19	7.57	7.49	7.4≥	7.23	223	193	725	189	189	<i>\\\</i> 5	13,6	13.4) 13 y	12.6	
	В	5	5	7	5	5											L					ji, re				-	100
	С	5	5_	4	5_	5																				-	100
	D	5	5	5	5	5											<u> </u>							1			100
Technician In	itials	5#	MD	JR	34	06							,		٠.												

Animal Source	Thomas	Date Received: 1/28/03	
Comments:	0 hrs:		
	48 hrs.		
	72 hrs.		
	96 hrs.		

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QA Check:

Final Review: 8cs 210/03

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Amec-Bearn Rangefinder	Start Date & Time: 1/29/03 (6@1)
Sample ID: BMSA	End Date & Time: 7-7.03 1216
Contact: Bul Alson	Test Organism: 0. myKi35
Test #: 0301 - 103	Test Protocol: FPA 1443

Concentration			Number of Dissolved Oxygen								en].		pН				Co	onduc	tivity	-		Ter	прега	ature		
ms/L	Rep			Orgai		1			(mg/		•		(pH un	its)			()	ımhos	s-cm)		ļ !		(°C))		Perc.
	тор	n	94	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	1000,000,000	17 /2	24	48		96	Surv.
500	A	5	5	V.	5	5	9.4	65	10.0	17.6	7.9	8.7	งกร	9754	7.43	7.37	31	139	370	307	305	15-2	13.6	12.9	13,1	R.G	100
	В	3	5	, m-	5	5																12.0					100
	C	<u>₹</u>	<	5	5	5																					100
<u></u>	D	3	5	5	5	5																57k					100
1000	Α	<	5	_	5	5	9.6	6,6	105	7,9	8.1	8.2	27.6	07.59	7,44	7.45	546	3467	54Z	451	449	سيحل	13.5	12.8	13.1	17.5	100
	В	5	5	.5	5	5																13.0					100
	С	S	5	5	5	5																					100
	D	3	Ś	5	5	5																					100
5000	Α	5	य	5	5	5	9.7	6.4	194	7.6	7.5	8,1	97.6	77.70	7.51	758	118	3 1688	1952	1622	598	13.0	13.4	129	13.0	17.5	100
<u> </u>	В	3	5	5	8	5																					100
	С	5	3	5	5	5																					100
	D	5	3	5	5	5																					100
Technician In	itials	5#	MD	JR	5 1	BR						,															

Animal Source	e: Thomas	Date Received:	1/28/03	
Comments:	0 hrs: 24 hrs. 48 hrs. 72 hrs.			
	1.			•

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QA Check:

Final Review: 3cs 2/10/03

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client:	Anec-Beazer	Rangefinder	Start Date & Time:	1/29/03	1600	<u>,</u>
Sample ID:	BMSA		End Date & Time:	2-2-03	1210	
Contact:	Bull Alson		Test Organism: _	O. mytris		
Test #: _	0301-103		Test Protocol:	EP4 (1993		

Concentration		Γ	Nı	ımber	of		Dissolved Oxygen								pН				C	ondu	tivit	y		Ter	npera	ature		
m/L	Rep	l			nisms				(mg/					(p	H un	its)				μ <mark>m</mark> ho			l .		(°C)			Perc.
	rtop	0		48	V. 111 . 177 . 17		0	97	///59	**	4.9	6	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	Surv.
10,000	A	ጟ	5	3	5	5	a۵	64	10.7	27.7	17	y	\$.21	7.68	7.69	7,51	7.60	36	313	3630	300	2960	(3.0	13.3	12,9	13,0	17.5	100
10,000	В	=	3	5	5	5																						100
	C	3		5		4																						100
	D	5	5	5	5	5																						100
	Ā				-3-			***************************************																		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	В																											
	c																											
	D	<u> </u>	 		-																							
	A															ſ												
	В	_	_																									
	C		<u> </u>																									
-	D																											
Technician In	itials	SH	MO	JR	5#	BR									<u> </u>											•		

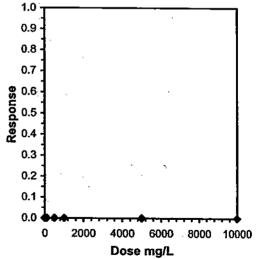
Animal Source:	Tho	mas	_	Date Receive	d: 1/28/03		·
Comments:	0 hrs: 24 hrs 48 hrs 72 hrs 96 hrs						AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044
QA Check:	ll	2/9/03	_	Final Review:	BUS 2/10/03		

Acute Fish Test-96 Hr Survival											
	01/29/200	-	Test ID:	0301-103		Sample ID:	BEAZER				
End Date:	02/02/200	3	Lab ID:			Sample Type:	OTH-Other sample type				
Sample Date:			Protocol: I	EPAA 91-E	PA Acute	Test Species:	OM-Oncorhynchus mykiss				
Comments:	Chemical	testing -	BMSA Rar	gefinder		•	and a state of the				
Conc-mg/L	1	2	3	4							
L-Lab Control	1.0000	1.0000	1.0000	1.0000			<u> </u>				
10	1.0000	1.0000	1.0000	1.0000							
100	1.0000	1.0000	1.0000	1.0000							
500	1.0000	1.0000	1.0000	1.0000							
1000	1.0000	1.0000	1.0000	1.0000	i,						
5000	1.0000	1.0000	1.0000	1.0000							
10000	1.0000	1.0000	1.0000	1.0000							

		_	Tra	ansform:	Arcsin Sc	uare Roof	<u>.</u>	Rank	1-Tailed	Isoto	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	. 4	-		1.0000	1.0000
. 10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
- 100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribi	ution $(p > 0)$.01)		1 .	0.896		
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU			· · · · · · · · · · · · · · · · · · ·	···
Steel's Many-One Rank Test	10000	>10000					· .	

Linear Interpolation (200 Resamples)										
Point	mg/L	ŞD	95% CL(Exp)	Skew						
IC05	>10000		·							
IC10	>10000			w.*	•					
IC15	>10000			1.0						
IC20	>10000			4						
IC25	>10000			0.9						
IC40	>10000			0.8]						
IC50	>10000									
				0.7 -						
				2 0.6						



96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client:	Amer - Beazer	Range Finder	Start Date & Time: 1/21/03 1600 End Date & Time: 70.2.007.2.03 1210
Sample ID:	PSA .	<u> </u>	Test Organism: O. mykiss
Contact:	Bui Alsop		Test Protocol: EPA 1993
Test #:	1301-105		

			N. I.	1		1	T	liceo	ved (Tevo	en	T		рH			i	Co	nduci	tivity		ļ	Ten	npera	ture		
Concentration				mber]	L				Ų11	ł	(n	H uni	(eti		ļ .	(u	mhos	-cm)				(°C)			Perc.
ms/L	Rep		Live	Orgai	usms	100000000000000000000000000000000000000		00020000	(mg/I	8 (4800000)	310 A		(P	1 33300 3550		802	en.		ndolono	72	96	0	24	48	72	96	Surv.
		-0	24	48	72	96	0	24	48	- 72	30		24	48	**************************************	74	100	11 7	156	16.3	// D	א נו	175	170	เรา	13.2	100
LC	A	\$	S	Ļ	5	5	<u>9.5</u>	6.4	10.5	8.3	179	799	77:34	16,10	7,37	40G	1182	166	(0 (163	16 a	15.0	12.3	13.0	13.	13,2	100
	В	5	5	4	54	5									<u></u>										-		100
	C	5	5	۲	'n	5						<u> </u>										-				-	100
	D	5	5	b	5	5											4	1/2	10-		1/2 00	/2.0	لدورا	/2,	13.4	12 9	
10	A	3	5	۲	5	5	٥	6.7	102	3.0	705	711	17.31	8.00	7.30	<u>7,35</u>	1188	163	170	160	کو ک	1 12/0	15:7	10.1	12.0	12.9	100
	В	5	5	ک	5	3																				1	100
	С	5	.5	7	.5	5																					
	D	5	3	5	5	5															0.44		120	13.		107	100
100	A	5	5	5	5	5	95	6.3	7.8	8,1	7.4	7.86	0739	7.FZ	7,37	17,43	1215	/35	2/7]131	צגון	15. 6	13.5	(5, /	12,5	12.7	100
100	B	S	Š	ک	5	5											ļ									+	100
	$\frac{1}{c}$	ट	5	5	5	5																					100
	D	15	5	3	5	5																					100
Technician In		JK		JR	SH	DR		********	•									•									

Animal Source	e: Thomas	Date Received: 1/28/03
Comments:	0 hrs:	
	48 hrs	
	72 hrs.	
	96 hrs.	
	, / ⁻	

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

QA Check:

2/9/03

Final Review: 30

Free	hwater	Acute
P TEX	nwater	ALUIC

Client:	Amec - Beazer	Rangetider	Start Date & Time:	1/29/03	1600	
Sample ID:	PSA		End Date & Time:	2.7.03	1210	
Contact:	BULL Alsog		Test Organism: O	. mytiss		_
Test #:	0301-105		Test Protocol: _ E	PA 1993		

			Nh	ımber	of	i	Г)ieeol	ved (Oxyge	en	T	,	pН				Co	nduc	tivity			Ten	прега	ture		
Concentration	n		_	Organ			_		mg/I					H uni				(L	ımho	s-cm)		ļ		(°C)			Perc.
	Rep	3000000000	1716	augundus	sperment (C	*****			70	99	O.		94	48	77	96	0	24	48	72	96	0	24	48	72	96	Surv.
			×29	40	SS 184.88	96	~~~	*************************************	e =	2.0	a ~	7.2	747	771	7,40	١٣٧	22A	274	326	270	270	130	123	13.0	12,9	12.6	100
500	A	Σ	5_	٦	5	5	9.1	6.4	2,ح	8.0	<i>†</i> 心	المد	1,51 1	'. / <u> </u>	ן טרונן	<i>1</i> 10 (25 1						, <u>, , , , , , , , , , , , , , , , , , </u>				100
	В	5	5	4	<u> </u>	5																					100
	С	5	5	ન	5	5																					
	D	5	5	۲	5	7																				44.0	100
1000	A	3	5	2	5	5	9.5	6.6	10.0	8,2	7.7	1.53	7.47	7.67	7,43	1,54	450	383	450	373	372	13.0	13:2	/3,0	12.9	12.5	100
(000	B	3	5	-	5	_					ĺ																100
	!	5	5	3		7																					100
	<u> </u>)			.5	5																					100
	D_	Ž		سی	5_	5_		/	/	_ ^	7.6		721	751	7,39	741	にけつ	17A	1C-36	1259	hu	13.0	13.1	12.9	127	12.4	100
5000	A	5	5	سي.	5		7.5	6.1	10.4	8,5) <i>}-</i> 7	11,20	יייין ו	7,5 (101	/(7/	7 27 6	121	NO	23	100	17.0	15.				100
	В	5	5	سي ا	5	5																-					100
	C	3	5	~	5_	5																-					
	D	3	5	سی	5	5																					100
Technician In	itials	JR	mo		 	BR			•																		

Animal Source	e. Thomas		Date Received:	1/28/03
Comments:	0 hrs: 24 hrs.			
	48 hrs.			
	72 hrs. 96 hrs.			
	11	•		

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

QA Check:

Final Review: 130

2/10/03

+ 1	A	4-
Frechwat	er A	cute

Client: Amec - Beazer Rangefinder Start Date & Time: 1/29/03 160	0
Client: Anet Fine: 7.7.03	<u>b</u>
Sample ID: PSA Contact: Bull Also Test Organism: O. mykiss Test Organism: O. mykiss	
Test Protocol: EPA 1993	

			NI.	ımber	of		Г	issol	ved (JXVOE	 en	Ţ		pН				Co	onduc	tivity		1	Ter	npera	ıture		
Concentration M/L	D				nisms				mg/L			1	(r	H uni	its)		1	. (ımhos	-cm)				(°C)		1 01101010	Perc.
-	Rep	*****	Live			06	a a	67.0	40	56	96		94	48	70	96	0	24	48	72	96	0	24	48	72		Surv.
		-	<u> </u>	48		200	<u>م</u> د	/ ₋ _1	a u	75	7~	107	7-7-7	7.27	726	102	240	22/0	7770	2290	2270	13.0	13.1	13,0	7,5	124	100
10,000	A	5	5_	2	5	Σ	ر .ا	<i>D</i> , []	7, 1	112	170	1,00	1,62	2 1.0 1	//	7.0		× 300									100
	В	_5	5	4	5_	5.						-					-										100
	С	5	5	1	5	5																					100
	D	5	5	٩	5	5																					- 200
	A							,								<u> </u>		*******			3						
	В																					ļ			.		
	С																				ļ				-		
	D																										
	A																	* *********	<u> </u>	00000000							
	В																		<u></u>				ļ				
	С					ļ																	.			4	
·	D	 		1																							
Technician In	itials	15	МΩ	JR	SIX	66								•		•									•		

Animal Source	e: Thoma	J		Date Received	1/28/03
Comments:	0 hrs: 24 hrs. 48 hrs. 72 hrs.				
			•		

AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121 (858) 458-9044

QA Check:

Final Review:

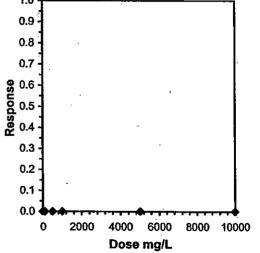
BCS 2/10/03

				Acute	Fish Test-	96 Hr Survival	
	01/29/2003 02/02/2003		Test ID: (Lab ID: Protocol: I)301-105 EPAA 91-EPA	\ Acute	Sample ID: Sample Type: Test Species:	BEAZER OTH-Other sample type OM-Oncorhynchus mykiss
Comments:	Chemical	testing -	PSA Range	efinder			an ansangneras mykles
Conc-mg/L	1	2	3	4		,	
L-Lab Control	1.0000	1.0000	1.0000	1.0000		,	
10	1.0000	1.0000	1.0000	1.0000			•
100	1.0000	1.0000	1.0000	1.0000			
500	1.0000	1.0000	1.0000	1.0000			
1000	1.0000	1.0000	1.0000	1.0000		,	
5000	1.0000	1.0000	1.0000	1.0000			
10000	1.0000	1.0000	1.0000	1.0000	-		

			Tra	ansform:	Arcsin Sc	uare Root	<u> </u>	Rank	1-Tailed	Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			1.0000	1.0000
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	1.0000	1.0000

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribi	ution $(p > 0)$.01)		1	0.896		
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤU				
Steel's Many-One Rank Test	10000	>10000			4			

			Linear Interpolation (2	200 Resamples)
Point	mg/L	SD	95% CL(Exp) Skew	·
IC05	>10000			· · · · · · · · · · · · · · · · · · ·
IC10	>10000			•
IC15	>10000			1.0 -
IC20	>10000		ŕ	, ·
IC25	>10000			0.9
IC40	>10000			0.8
IC50	>10000		·	
				0.7 -
			••	9 0.6 -
				,
			·	୭୪ ୦.6 - ୦୦ ୦.5 - ୧୪ ୦.4 -
				ĕ 0.4 -



Lepomis macrochirus

_	res	L	4	1	١	-1.
-	rac	m,	/ 17 (3F /	ויאנ	пα

Client: AMEC/Beazer	Start Date & Time: 4/23/03 14:30	
Sample iD: BMDSA	End Date & Time: 4/27/03 430	
Contact: Bill Alsop	Test Organism: <i>L. macrochirus</i>	
Test #: M754- 177	Test Protocol: ASTM E1241-98	

Concentration	oncentration Number of			Dissolved Oxygen						pН					Conductivity					Temperature							
mg/L	Rep		Live	Organ	nisms		1	•	(mg/L	.)		ļ .	(pH uni	ts)			(umhos	-cm)		<u> </u>	11	(°C)	arania a	. 	Perc.
	• ;	0	24	48	72	96	Q	24	48	72	96	0	24		72	96	Ø	24	48	72	96	0	24	48	72	96	Surv.
Lab Control	Α	5	3	5	5	5	4.1	39	7.6	7.1	4.0	8,23	7:49	7,99	7,86	7.86	856	769	773	787	<u> 105</u>	20,9	70.4	20.≥	20.3	203	100
	В	5	5	5	5	5															5		12,000,000				100
10	Α	5	5	5	5	5	9.1	2.8	7.4	7,9	8.4	8.22	750	296	7,96	793	861	774	776	790	904	209	20.4	30 ,0	20, ì	20.1	100
	В	5	5	5	5	5																					100
100	Α	5	5	5	5	5	4,0	34	7.2	7.4	7.5	8,22	253	7,93	791	7.84	919	824	826	638	958	20.9	20.4	20,1	20.0	20,0	100
	В	5	5	5	5	3																					100
500	Ā	5	5	5	5	5	4.0	3.6	6.2	7,2	7.5	6,22	7:33	7,81	7.86	7.83	NZ8	1035	1043	1053	20	21.0	20.4	20.2	20.2	20.1	100
	В	5	5	5	5	5	2/3					X-1	(80)								1						100
1,000.	Α	5	5	5	5_	5	9.0	4.2	6.7	7,7	4.1	8,25	7.56	7.86	7,95	193	W57	1304	1311	1331	1526	20.9	20.3	20,0	20.2	- Zo (Loo
	В	5	5	5	5	5													P. C. T. C. S.								100
5,000	Α	S	5	5	5	5	9.1	3.8	5.4	8,9	9.2	829	7.60	7,68	8:16	3.14	37∞	32RO	3510	42 8	<i>36</i> 0	20.8	20.4	20,0	20,0	30.	100
	В	5	5	5	5	5																					100
10,000	Α	5	5	5	5	5	4.2	3 6	5,7	7,8	7.6	8,30	76	7,75	7.89	7.85	6330	5610	5630	5450	(3HQC	20.7	20. Ý	≥ 0,0	20,2	20.1	100
	В	5	5	5	5	5																					100
Technician In	itials	SH	PG ₁	5 H	SH	Mδ]																				

Animal Source: OSage	Date Received: 42203	٠
Comments: 0 hrs: range finder 24 hrs. Acrased Test		AMEC Earth and Environmental
48 hrs. 72 hrs.		5550 Morehouse Dr., Sulte B San Diego, CA 92121 (858) 458-9044
96 hrs. OA Check: TK 5/22/03	Final Review: Jn 6/2/03	(838) 430-9044

: چنرین

Acute Fish Test-96 Hr Survival							
	04/23/2003	-	Test ID: 0304-178	Sample ID:	BEAZER		
	04/27/2003	3	Lab ID:	Sample Type:	OTH-Other sample type		
Sample Date:			Protocol: ASTM E1241	Test Species:	LM-Lepomis macrochirus		
Comments:	Chemical	testing -	BMSA Rangefinder	•	•		
Conc-mg/L	1	2					
L-Lab Control	1.0000	1.0000)				
10	1.0000	1.0000			•		
100	1.0000	1.0000					
500	1.0000	1.0000	•				
1000	1.0000	1.0000)				
5000	1.0000	1.0000	1				
10000	1.0000	1.0000)				

		Isotonic							
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1.0000	1.0000
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1.0000	1.0000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1,0000	1.0000
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	· 2	1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	1.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				

Equality of variance cannot be confirmed

-			Line	ear Interpolation (2	00 Resamples)	-			
Point	mg/L	SD	95% CL(Exp)	Skew					
C05	>10000								
C10	>10000			; ·					
C15	>10000				1.0		<u> </u>		
C20	>10000				4				
C25	>10000				0.9				
C40	>10000				0.8				
C50	>10000					•	•		
					0.7				
					% 0.6 -				
					9.0.6 - 0.5 - 0.4 -		•	- }	
					8	-		1	
					2 0.4	·			
			•		0.3 -				
					0.2				
					0.1 -				
					0.0				
						2000 4000 (3000 8000	10000	

Dose mg/L

_				-	
		hwa	***		11 1TA
	_		4111	ж.	.1116

Client: AMEC/Beazer	Start Date & Time: 42303 15:05
Sample ID: PSA	End Date & Time: 4/27/03 1430
Contact: Bill Alsop	Test Organism: L. macrochirus
Test #: 0704-179	Test Protocol: ASTM E1241-98

Concentration		T	N	lumber	of			Disso	ived C)xyger	n 	$\overline{}$		pН		_		Conductivity									
mg/L	Rep			Organ					(mg/L				()	oH uni	ts)		(µmhos-cm)					(°C)					Perc.
	٠ ا	0	24	48	72	96	l o	24	48	72	96	0	24	48	72	96	Ó	24	48	72	96	0	24	48	72	96	Surv.
Lab Control	Α	5	5	5	5	5	8.9	4.4	7.1	8.0	85	8.27	7.57	7,85	7,89	791	856	769	773	780	897	રુડ,૧	285	20,3	20,4	20.1	100
	В	5	5	5	5	9						選業														翻翻翻	100
10	Α	5	5	5	5	6	8.9	4,1	C,0	7,0	7.9	8,23	7.56	7.75	7.79	7.86	860	777	777	785	895	20.9	20.5	20,2	20,2	20.3	100
	В	5	5	5	5	5											2023										100
100	Α	5	5	5	5	5	ଷ,୩	2.7	6,2	7,4	84	8.04	7.53	7,84	7,88	1.95	687	794	799	807	925	2 0,9	20-5	20.0	20,1	20.1	100
	В	5	5	5	5	5																					100
500	Α	5	5	5	5	5	8,9	30	7,6	8,6	7.9	7.72	7.6(7,48	8,05	7,40	1009	899	415	924	1054	20.8	20.5	20,0	20,0	20.0	100
	В	5	ž	5	5_	15													4								100
1,000	Α	5	5	5	5	5	8.9	4,6	6.6	7.7	7.8	7.54	7.53	7.81	7,88	7.66	1163	1024	<i>1</i> 03≥	1042	1182	20.8	205	20,2	20,2	20.3	100
<u> </u>	В	5	.5	5	5	5																		4			100
5,000	Α	5	5	5	5	5	8.9	4.2	7.2	8,4	4.4	7.08	7-42	7,62	7.72	7.72	2290	2040	2050	2070	2340	20.4	20.4	<i>2</i> 0,≥	20.3	20.3	100
	В	5	5	5	5	6																					100
10,000	Α	5	15	5	5	5	9.0	3.4	7,2	8,4	76.F	6.88	7.20	7,40	7.47	7.47	3630	3210	3≥3∞	3≥40	<i>364</i> 0	19.9	20.5	æ.∘	20,≥	20.1	100
	В	5	5	5	5	5					2.2									1 (1) (1) 2 (1) (1)							100
Technician In	itials	SH	Rb	SH	SH	MO																					

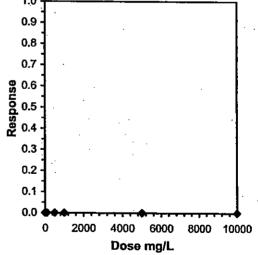
Animal Source: 05age	Date Received: 4/22/03	_
Comments: 0 hrs: <u>range</u> - Finder 24 hrs. <u>Aerofed Test</u> 48 hrs. 72 hrs.		AMEC Earth and Environmental 5550 Morehouse Dr., Suite B San Diego, CA 92121
96 hrs.	Final Review TR 6/2/03	(858) 458-9044

			Acute Fish 1	Test-96 Hr Survival	
End Date: (Sample Date:	04/23/2003 04/27/2003 Chemical	3	Test ID: 0304-179 Lab ID: Protocol: ASTM E1241 PSA Rangefinder	Sample ID: Sample Type: Test Species:	BEAZER OTH-Other sample type LM-Lepomis macrochirus
Conc-mg/L	1	2	<u> </u>		
L-Lab Control	1.0000	1.0000		- ,	
10	1.0000	1.0000	l e e e e e e e e e e e e e e e e e e e		
100	1.0000	1.0000	•		
500	1.0000	1.0000	•		
1000	1.0000	1.0000	ı		
5000	1.0000	1.0000	•		
10000	1.0000	1.0000)		

		_	Tra	ansform:	sform: Arcsin Square Root				Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N		Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	•	1.0000	1.0000
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2 .		1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	. ,	1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	·	1.0000	1.0000
:5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew Kurt
Normality of the data set cannot be confirmed			

IC15 >10000 IC20 >10000 IC25 >10000	Point mg/L SD 95% CL(Exp) Skew IC05 >10000 IC10 >10000 IC15 >10000 IC20 >10000	>10000 >10000	SD	95% CL(Exp)		<u> </u>	· .		
IC05 >10000 IC10 >10000 IC15 >10000 IC20 >10000 IC25 >10000	IC05 >10000 IC10 >10000 IC15 >10000 IC20 >10000 IC25 >10000 IC40 >10000 IC50 >10000	>10000			· · · · · · · · · · · · · · · · · · ·				
IC15 >10000 IC20 >10000 IC25 >10000	IC15 >10000 IC20 >10000 IC25 >10000 IC40 >10000 IC50 >10000								
IC20 >10000 IC25 >10000	IC20 >10000 IC25 >10000 0.9 - IC40 >10000 0.8 -	×40000							
IC20 >10000 IC25 >10000	IC20 >10000 IC25 >10000 0.9 - IC40 >10000 0.8 -	>10000				0			
1020 70000	IC40 >10000 IC50 >10000					` - .			
IC40 >10000 :	IC50 >1000	>10000			0.	.9 -			1
1070 /1000	IC50 >1000	>10000			0	.s.]			ŀ
IC50 >1000	0.7 -	>10000		•		1			
			>10000	>10000	>10000	>10000 >10000 >10000	>10000 >10000 >10000 0.7	>10000 >10000 >10000 0.7	>10000 >10000 >10000



Brachionus calyciflorus

AMEC Earth & Environmental Torthwest Bioassay Lab 1 009 Pacific Hwy. E., Suite 2 Fife, WA 98424

> Client: Beazer Sample ID: $\beta M D \leq A$ Test #: 0304-14 NW

Rotifer Rapid Screen Test 24 Hour Acute Test Data Sheet

Range finder - 3 reps

Start Date & Time: End Date & Time: 4/9/03 Test Organism: Brachionus calyciflorus

Conc.	D (mg	1	pl (un	13	Condu (µS/		Tempe (°	erature C)	Alkalinity (mg/L a	Hardr as CaCO	Chlorine (mg/L)
1 mg/L		24		1.82	0	24	0	24			
0	7.8	24 V. 48	7.91	190	304	3293	25.0	24.4	60	80	
10	8,0	7.2	7.99	8,04	360	3614	25.0 25.0	24.7			
500	7.9	7.4	8.02	1.880	609	4901	25.0	249			
1 5000	7.9	7.1	8.02	8.02	3060	Lestos	25.0	24.5			
10000	8.0	7.2	8,02	8,04	5480	5920	25.0	24. 9	60	-80	

§ _	Contract			roti	fer		Conc.		A A	roti	fer	1
The second of	Conc.			#		%				#	<u> </u>	%
	or,,	Bon	Cont.	"		Survival	or	Rep	Cont.	- 		Survival
1	nug//	Rep #	#	0	24		%	#	# 8	0	24	
				5	5	100	1000	1	25	5	5	100
ŀ	0	1	1	5	5	100		2	26	5	5	
9 -		2	2	5	5			3	27	5	5	
and a		3	3	5	<u> </u>			4	28	5		
		4	<u>4</u> 5					5	29	5_		
1		<u>5</u>	5 6	5	 		2	6	30	5		,
· ·				5	5	100	5000	1	31	5	2	43
۲. ا	10	1	7	5	5	1-100		2	32	5	3	
Ι,		2	8	5	5	<u> </u>		3	33	5	3	
	·	3_	9		 -	 		4	34	5		
•		4	10	<u>5</u>	 	 		5	35	5		
T		5	11	5 5	 	 		6	36	5		
		6			 	100	10,000	2	37	5	T_{I}	7
•	100	1	13	5	5	100	1	3	38	5	6	
7		2	14	5		<u> </u>		4	39	5	0	
1	L	3	15	5	5	 		5	40	5		
L .:.		4	16	5_	-}	 	<u> </u>	6	41	5		
ħ.		5_	17	5	┷	 		$\frac{3}{1}$	42	5		
		6		5	+	 		1	43	5	 	
*	500	1	19	5	5	100		2	44	5	+ -	†
Æ		2	20	5	5		<u> </u>	3	45	5	 	
		3	21	5	5		<u> </u>	$\frac{3}{4}$	46	5		
11. :		4	22	5_		_		 + 5	47	5	 -	
ď		5	23	5				6	48	5	+-	
		6	24	5	4		K			-	mi	,
4 . '.		1	Analyst_		M	싀			Analyst Analysts	· ///	m	

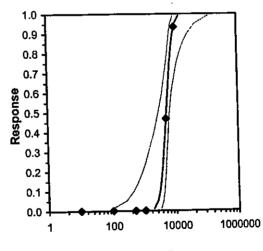
Comments:

	•			F	Rotifer Te	st-24 Hr S	Survival					
Start Date:	4/8/03	,		0304-14NV			Sample ID:		BEAZER			
nd Date:	4/9/03			Waaee-ai					BMDSA-be		- ,	nic acid
ample Date:	4/8/03		Protocol: .	ASTM E14	40	T	Fest Speci	es:	BC-Brachio	onus calyo	ciflorus	
comments:	range find	ing test			<u> </u>							
Conc-mg/L	1	2	3									
D-Control	1.0000	1.0000	1.0000									
10	1.0000	1.0000	1.0000									
100	1.0000	1.0000	1.0000									
500	1.0000	1.0000	1.0000									
1000	1.0000	1.0000	1.0000									
5000	0.4000	0.6000	0.6000			,						
						•						
5000	0.4000	0.6000	0.6000			•						
5000	0.4000	0.6000	0.6000 0.0000	ransform:	Arcsin So	uare Roo	ot		1-Tailed		Number	Total
5000 10000	0.4000 0.2000	0.6000 0.0000	0.6000 0.0000 Ti	ransform:	Arcsin So Max	uare Roo	ot N	t-Stat	1-Tailed Critical	MSD	Number Resp	Numbe
5000 10000 Conc-mg/L	0.4000 0.2000 Mean	0.6000	0.6000 0.0000	ransform: / Min 1.3453			ot N	t-Stat		MSD		Number
5000 10000 Conc-mg/L D-Control	0.4000 0.2000 Mean 1.0000	0.6000 0.0000 N-Mean	0.6000 0.0000 Ti	Min	Max	CV%	N	t-Stat	Critical 2.530	MSD 0.1406	Resp	Number 1
5000 10000 Conc-mg/L D-Control	0.4000 0.2000 Mean 1.0000 1.0000	0.6000 0.0000 N-Mean 1.0000	0.6000 0.0000 Ti Mean 1.3453	Min 1.3453	Max 1.3453	CV% 0.000	N 3		2.530 2.530	0.1406 0.1406	0 0 0	Number 1
5000 10000 Conc-mg/L D-Control 10 100	0.4000 0.2000 Mean 1.0000 1.0000 1.0000	0.6000 0.0000 N-Mean 1.0000 1.0000	0.6000 0.0000 Ti Mean 1.3453 1.3453	Min 1.3453 1.3453 1.3453	Max 1.3453 1.3453	0.000 0.000	3 3 3 3	0.000 0.000 0.000	2.530 2.530 2.530	0.1406 0.1406 0.1406	0 0 0 0	Numbe
5000 10000 Conc-mg/L D-Control	0.4000 0.2000 Mean 1.0000 1.0000 1.0000	0.6000 0.0000 N-Mean 1.0000 1.0000	0.6000 0.0000 Ti Mean 1.3453 1.3453 1.3453	Min 1.3453 1.3453 1.3453 1.3453	Max 1.3453 1.3453 1.3453	0.000 0.000 0.000 0.000 0.000	3 3 3 3 3	0.000 0.000 0.000 0.000	2.530 2.530 2.530 2.530 2.530	0.1406 0.1406 0.1406 0.1406	0 0 0 0 0	Numb
5000 10000 Conc-mg/L D-Control 100 500	0.4000 0.2000 Mean 1.0000 1.0000 1.0000 1.0000 1.0000	0.6000 0.0000 N-Mean 1.0000 1.0000 1.0000	0.6000 0.0000 TI Mean 1.3453 1.3453 1.3453 1.3453	Min 1.3453 1.3453 1.3453 1.3453 1.3453	Max 1.3453 1.3453 1.3453 1.3453	0.000 0.000 0.000 0.000	3 3 3 3	0.000 0.000 0.000	2.530 2.530 2.530 2.530 2.530 2.530	0.1406 0.1406 0.1406	0 0 0 0	Numb

	Auxiliary Tests					Statistic		Critical		Skew	<u>Kurt</u>
1	Shapiro-Wilk's Test indicates non-	normal dis	stribution	(p <= 0.01)		0.74966		0.873		0.3553	3.43217
	Equality of variance cannot be con Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
_	Dunnett's Test	1000	5000	2236.07		0.07814	0.08225	0.50439	0.00463	6.2E-11	6, 14

	-			Ma	ximum Li	ikeiino	οα-Ριφοιτ						
 Parameter	Value	SE	95% Fidu	clai Limits	C	ontrol	Chi-Sq	Critical		Mu	Sigma	lter	_
¬ Slope	5.27918		1.49335	9.06502		0	0.00126	9.48773	1	3.71513	0.18942	3	
Intercept	-14.013	1.32011	-20.55	0.2000			1.0			- 11			

TSCR				
Point	Probits	mg/L		cial Limits
"EC01	2.674	1881.35	91.4216	3178.94
EC05	3.355	2532.56	258.772	3818.96
EC10	3.718	2967.41	449.145	4225.06
. EC15	3.964	3302.24	650.033	4533.8
EC20	4.158	3595.1	870.188	4805.39
_ EC25	4.326	3866.96	1115.13	5062.56
EC40	4.747	4646.69	2048.08	5872.43
EC50	5.000	5189.6	2879.7	6582.89
EC60	5.253	5795.93	3879.12	7702.44
EC75	5.674	6964.62	5438.56	11704.4
EC80	5.842	7491.28	5932.58	14485.8
EC85	6.036	8155.64	6447.41	18912.3
EC90	6.282	9075.89	7047.33	26871
EC95	6.645	10634.3	7910.81	45966.8
EC99	7.326	14315.2	9614.88	128604
Significant he		detected	d (p < 0.01)



Dose mg/L

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2 Fife, WA 98424

Rotifer Rapid Screen Test 24 Hour Acute Test Data Sheet

Range finder - 3 reps

Client: Sample ID: BMS/ Test #:

Start Date & Time: End Date & Time: Test Organism: Brachionus calyciflorus

, [Conc.	_	0	p		9		Temp	erature	Alkalinity	Hardness s CaCO ₃)	Chlorine (mg/L)
1,	w/L	(m	₂ /L)	(ui	its)	<u>(μ</u> S/				(mg/c d		(119/2/
إ	<i>%</i>	0	24	0	24	0	24	0	24		-	
(0	7.8	7.1	791	7.20	304	324		24.4	60	80	
٦,	10	7.9	7-3	192	8,12	360	292	图	24.4			
١, ١	100	8.1	7.4	7,7/	8.07	340	365		24.5			
	500	8.1	7.4	7.98	8.08	494	<u>'''</u>		44.5		274	7.00
1	1000	7.9	7.1	7.98	8.09	696	744	<u> </u>	24-7		# 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1	
	500 U	8:1	7.4	7.96	8.07	2090	2220		25.1			
3	10,000	8.1	7.0	7.95	8.03	3940	4170	<u> </u>	24-)			
ı.	· · · · · · · · · · · · · · · · · · ·				<u>i i</u>	ä		#		60	180 .	

	Conc.			rot			Conc.			roti		%
	or			#	*	%	or	_D	C	#	f	% Survival
ļ	MG/L	Rep	Cont.			Survival	ω.	Rep #	Cont.	0	24	Sulvivai
		#	#	0	24		%	1	25		5	100
```		1	1	5	5	100	_/0 <i>00</i>	2	26		5	100
<b>,                                    </b>		2	2	5	5			3	27	_	5	
		3	3	5	5	<del></del>		4	28	5		
`		4.	<u>4</u> 5	5 5	<del>  </del>			5	29	5		
		<u>5</u> 6	6	5	<del>                                     </del>			6	30	5		
. ,	10	1	7		5	100	5000	1	31	5	4	93
1	70	2	8	5	5		-1.11	2	32	5	5	
,		3	9	5	3			3	33	5	5	
i		4	10	5		_		4	34	5		
		5	11	5				5	35_	5		
[ ]	1	6	12	5				6	36	5	<u> </u>	
L_'	100	1	13	5	5_	(00	10,000	2	37	5	4_	13
_		2	14	5	5			3	38	5	3_	ļ <del></del>
		3	15	5	5			4_	39	5	1	
ا ـ ـا		4	16	5		,		5	40	5_	<u> </u>	<del> </del> -
		5	17	5	<u></u>			6	41	5	<u> </u>	
		6	18	5	<u> </u>			1	42	5	<del> </del>	<u> </u>
L,_	500	1	19	5	5	log		1	43	5	<del> </del>	<del> </del>
F		2	20	5_	<u> </u>		<b></b>	2		5	<del> </del>	<del> </del>
		3	21	5	5		<u> </u>	3	45	5	<del>├</del>	<del> </del>
	<u></u>	4	22	5	↓			4	46	5_	╂——	<del> </del>
ſ.		5	23	5	<u> </u>	<u> </u>		5	47	5	<del> </del>	<del> </del>
	<u></u>	6	اج.ــــــــــــــــــــــــــــــــــــ	5_	<del> </del>		<b>a</b>	6	48	5	1	
		Ar	nalyst	1	W		1 . (	Aı	nalyst	1	1 m-	J

Highest Concentration, kotitors alive but not moving Analysts: B Comments:

		-	•	Rotifer Test-	24 Hr Survival	
Start Date:	4/8/03		Test ID:	0304-15NW	Sample ID:	BEAZER
ind Date:	4/9/03		Lab ID:	WAAEE-AMEC NW Bio	assa ₎ Sample Type:	BMSA-benzene monosulfonic acid
Jample Date:	4/8/03		Protocol:	ASTM E1440	Test Species:	BC-Brachionus calyciflorus
Comments:	range find	ling test				
Conc-mg/L	1	2	3		· · ·	·
D-Control	1.0000	1.0000	1.0000			
10	1.0000	1.0000	1.0000			
100	1.0000	1.0000	1.0000			
500	1.0000	1.0000	1.0000	ı		
1000	1.0000	1.0000	1.0000			
5000	0.8000	1.0000	1.0000	1		
10000	0.8000	0.6000	0.2000	1		

-				Tra	nsform:	Arcsin Sc	uare Roof	t	_	1-Tailed		Number	Total
ľ	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
1	D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3				0	. 15
4	10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.2769	0	15
	100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.2769	0	15
	500	1.0000		1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.2769	0	15
1	1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.2769	0	15
		0.9333		1.2659	1.1071	1.3453	10.861	3	0.725	2.530	0.2769	1	15
ã	5000 *10000	0.9333		0.8190	0.4636	1.1071	39.924	3	4.808	2.530	0.2769	7	15

	Auxiliary Tests					Statistic		Critical		Skew	Kurt
ST.	Shapiro-Wilk's Test indicates non-	normal dis	tribution (	(p <= 0.01)		0.66585	-	0.873		-0.925	6.55047
ý	Equality of variance cannot be con	firmed							HÔE	E Deals	
	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	<u>ur</u>
	Dunnett's Test	5000	10000	7071.07		0.18191	0.19148	0.11545	0.01797	0.00202	6, 14

		<del>_</del>		Ma	ximum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control		Critical	P-value	Mu	Sigma	lter
Slope	4.70883	1.97297	0.84182	8.57585	0	1.2E-05	9.48773	1	4.01776	0.21237	3
Intercept		7.72001	-29.05	1.21225							
TSCR						1.0 7					
Point	Probits	mg/L	95% Fldu	cial Limits		0.9		- 11	/		
EC01	2.674	3339.82	53.36	5224.36		0.8		- 11		ł	
EC05	3.355	4660.68	335.223	6440.65		4		11		ļ	
EC10	3.718	5566.76	877.934			0.7		jj.			
`EC15	3.964	6275.63	1649.08	8141.6		<b>9</b> 0.6		]]		i	
EC20	4.158	6902.86	2649.87			Response 0.2 0.4		- 1	/		
EC25	4.326	7490.7	3820.88	10421.9		g S		<b>.</b>	/		
EC40	4.747					<b>Ö</b> 0.4 -		/1/		ì	
EC50	5.000	10417.5				0.3 -		- 11/			
EC60	5.253	11791.4				0.2 -	Į	/		- 1	
EC75	5.674	14487.7	7 10416				1				
r : EC80	5.842	15721.5				0.1 -	1	/ #			
EC85	6.036	17292.8				0.0 -	• <b>♦</b> ••••		T T T T T T T T T T T T T T T T T T T	<del>, , , , , , , , , , , , , , , , , , , </del>	
EC90	6.282	19494.9		1130459			1 10	0 1000	00 100000	00 1E+08	
EC95	6.645			3030036							
EC99	7.326			1.9E+07				Dose r	ng/L		
Significant h	eterogeneit	y detecte	d (p < 0.01	)							

Rotifer Test-24 Hr Survival 4/8/03 Test ID: 0304-15NW Sample ID: BEAZER Start Date: 4/9/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: BMSA-benzene monosulfonic acid ind Date: Test Species: BC-Brachionus calyciflorus ample Date: 4/8/03 Protocol: ASTM E1440 range finding test Comments: Dose-Response Plot 0.9 1-tail, 0.05 level of significance 0.8 0.7 24 Hr Survival 0.2 0.1 0 5 200 ė

AMEC Earth & Environmental Northwest Bioassay Lab 5009 Pacific Hwy. E., Suite 2 Fife, WA 98424

Comments:

Rotifer Rapid Screen Test
24 Hour Acute Test Data Sheet

Beazer-Range Finder 3reps

Client: <u>Beazer</u>
Sample ID: <u>P5A</u>
Test #: <u>0304-16000</u>

Start Date & Time:  $\frac{4/8}{63}$  /230 End Date & Time:  $\frac{4/9}{03}$  1155

Test Organism: Brachionus calyciflorus

1	Conc. or	_	O ₂ /L)	-	H uits)	Condu (µS/	•	Temp (°	erature °C)	Alkalinity (mg/L a	Hardness s CaCO ₃ )	Chlorine (mg/L)
1	mg/C	0	24	0	24	0	24	0	24			
- ( )	0	7.8	ا، ۳	7.91	7.90	304	324		24.4	60	80	
1,	10	8.0	7.3	7.90	8.04	<i>3</i> 03	328		24.7			
,	100	7.7	7.2	7.75	8.03	334	361		<del>- </del>			
\ \ \	500	7.8	7,4	148	7.88	452	490	#	24.9			
4	1000	7.9	<del>                                     </del>	7.35	7./1	1725	2.7		24.5			
ŧ	5000	8.0	7.1	6.73	712	3080		tanii .	24.6			
Ĺ.	10,000	0.1										

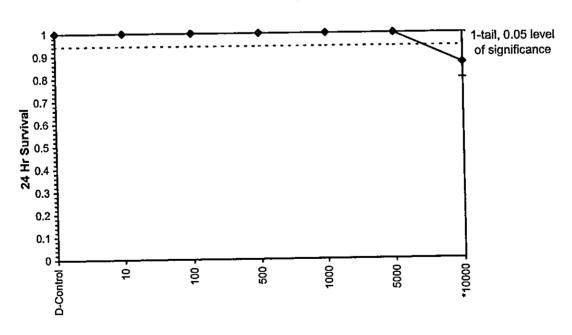
Conc.				ifer		Conc.			roti #		%
or	1 1		;	#	%	or	ا سرا	C	,	<i>†</i>	Survival
Mg/L	Rep	Cont.		1	Survival		Rep #	Cont.	0	24	Jaivivai
782	#		0	24		<u>%</u>			5	5	100
0	1	1		5	100	1000	1	25			100
	2_	2	5	5			2	26	<u>5</u>	5 1	
	3	3	5	5_			3_	27			
	4	4	5	<u> </u>		<u></u>	4_	28	5_	<del> </del> -	<del></del> -
	5	5_	5_	<u> </u>		<u> </u>	5	29	<u>5</u> 5	<b></b> -	
	6	6	5				6	30			100
/0	1	7	_5	5	100	5000	1	31	5	5	100
	2	8	5	5			2	32	5	5	<del> </del>
	3		5	5			3_	33	5_	5	<del> </del>
	4	10	5			<b></b>	4_	34	5	<del>}</del>	<del> </del>
	5	11	5				5	35		<del></del>	<del> </del>
	6	12	5				6	36	5	<del>  ./-</del>	C-17
100	1	13_	5	5	100	10,000	2	37	5	4-	87
	2	14	5	5			3	38	5	15	<del> </del>
	3	15	5_	5		<u></u>	4	39	5	<del> </del>	<del> </del>
	4	16	5		<u> </u>		5	40_	5	<del> </del>	<del> </del>
	5	17	5_			<b></b>	6	41	5_	<del> </del>	<del> </del>
	6	18	5		<u> </u>		1		5	┼	
500	1	19	5	5	109		1_		5	<del>                                      </del>	
	2	20	5	5		<b></b>	2	44	5	<del>-</del>	<del> </del>
	3	21	5	5			3		5	<del> </del>	
	4	22	5				4	.46	5		
	5	23	5				5		5	-	
<del></del>	6	24	5				6	48	5		<del></del>
	A	nalyst		WU		-		malyst malvsts:	1	w	,

		٠.		Rotifer Tes	t-24 Hr Survival	
	4/8/03			0304-16NW	Sample ID:	BEAZER
	4/9/03			WAAEE-AMEC NW B	•	PSA-p-phenol sulfonic acid
Sample Date:	4/8/03		Protocol:	ASTM E1440	Test Species:	BC-Brachionus calyciflorus
Comments: _	range find	ling test				
Conc-mg/L	1	2	3			
D-Control	1.0000	1.0000	1.0000			
10	1.0000	1.0000	1.0000			
100	1.0000	1,0000	1.0000			
500	1.0000	1.0000	1.0000			
1000	1.0000	1.0000	1.0000			
5000	1.0000	1.0000	1.0000			
10000	0.8000	0.8000	1.0000	•		

				Tra	nsform:	Arcsin Sq	uare Root		1-Tailed	<del></del> -	
٠ (	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat_	Critical	MSD
_	D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3			
:	10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.1073
	100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.1073
-	500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.1073
	1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	3	0.000	2.530	0.1073
-		1.0000		1.3453	1.3453	1,3453	0.000	3	0.000	2.530	0.1073
	5000 *10000	0.8667	0.8667	1.1865	1.1071	1.3453	11.587	3	3.742	2.530	0.1073

Auxiliary Tests					Statistic		Critical		Skew_	Kurt
Shapiro-Wilk's Test indicates non		stribution	(p <= 0.01)		0.48815		0.873		2.01793	10
Equality of variance cannot be co	nfirmed NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Hypothesis Test (1-tail, 0.05)  Dunnett's Test	5000	10000	7071.07				0.0108	0.0027	0.01528	6, 14

#### Dose-Response Plot



Acute Exposure Appendix C
Bioassay Water Quality, Survival, and Statistical Summaries
Definitive Study

Ceriodaphnia dubia
Acute Exposure

# Appendix Table C-1a. Water Quality Summary for 48-hour *Ceriodaphnia dubia*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 10 December 2002

Concentration	Rep		mber of Organisr			O g/L)		H units)		nd. os/cm)	Tem	perature	(°C)	Percen Surviva
(mg/L)	1	0	24	48	0	48	0_	48	0	48	0	24	48	Outvive
	Α	5	5	5	7.9	8.5	8.09	8.05	192	203	24.0	24.2	24.1	100
Control	В	5	.5	5			S. 22.55							100
Control	Ċ	5	5	5									is a suidi	100
	D	5	5	5										100
	Α	5	5	5	7.9	8.5	8.21	8.17	494	477	24.0	24.2	24.1	100
500	В	5	5	5										100
500	С	5	5	5										100
	D	5	5	5										100
	Α	5	5	5	7.9	8.5	8.25	8.17	731	769	24.0	24.2	24.1	100
1 000	В	5	5	5										100
1,000	ट	5	5	5								المراجعة		100
	П	5	5	5										100
	Α	5	5	5	7.9	8.2	8.26	8.16	1375	1333	24.0	24.2	24.1	100
2,000	В	5_	5	5										100
2,000	С	5	5	5										100
	D	5	5	5										100
	Α	5	5	4	7.9	8.2	8.26	8.18	2490	2380	24.0	24.2	24.1	80
4,000	В	5	5	5										100
7,000	С	5	5	5										100
	ם	5	5	5					1					100
	Α	5	5	1	7.9	8.2	8.25	8.17	4720	4460	24.0	24.2	24.1	20
9 000	В	5	5	1										20
8,000	С	5	5	2					V-2014.A					40
	D	5	5	3										60
	Α	5	5	2	7.9	8.3	8.24	8.13	5700	5670	24.0	24.2	24.1	40
10,000	В	5	4	0										0
10,000	С	5	5	0				المساهد						0
	D	5	5	0		Action to the second								0

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

<del></del>				Daphnia Ac	ute Survival Bio	assay-48 Hr Su	rvival
Start Date: End Date: Sample Date: Comments:	12/10/2002 12/12/2002 BMDSA		Test ID: Lab ID:	0212-129	IEC Bioassay SD	Sample ID:	BEAZER Industrial Product CD-Ceriodaphnia dubia
Conc-mg/L	1	2	3	4			
L-Lab Control	1.0000	1.0000	1.0000	1.0000			
500	1.0000	1.0000	1.0000	1.0000			
1000	1.0000	1.0000	1.0000	1.0000			
2000	1.0000	1.0000	1.0000	1.0000			
4000	0.8000	1.0000	1.0000	1.0000			
8000	0.2000	0.2000	0.4000	0.6000			
10000	0.4000	0.0000	0.0000	0.0000			

			Tr	ansform:	Arcsin Sc	uare Roof	t	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			<u> </u>	20
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
2000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
4000	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20 20
*8000	0.3500	0.3500	0.6245	0.4636	0.8861	32.527	4	10.00	10.00	13	
*10000	0.1000	0.1000	0.3403	0.2255	0.6847	67.468	4	10.00	10.00		20
		•			5,0011	01.400	7	10.00	10.00	18	20

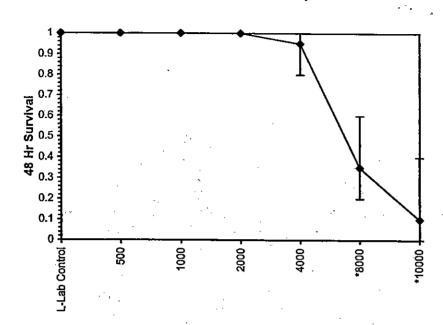
Auxiliary Tests			•	S	Statistic		Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non		stribution	(p <= 0.01)		).78913		0.896		3.58019
Equality of variance cannot be con	nfirmed			-,	1.1	11,			0.00013
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU ,		* 1		<del></del>	
Steel's Many-One Rank Test	4000	8000	5656.85						<del></del>

	<u> </u>		. 4	<u> </u>	· 4	54.					
•				N.	laximum Likeliho	od-Probit			<del></del> .		<del> </del>
Parameter	Value	SE	95% Fidu	icial Limits			Critical	P-value	Mu	Sigma	lter
Slope	7.22904	1.50671	4.27588	10.1822	. 0	0.18791		1	3.83785	0.13833	3
Intercept	-22.744	5.85128	-34.212	-11.275			01,10110		0.00700	0.10000	3
TSCR				•	4	1.0 -	<u> </u>	_			
Point	Probits	mg/L	95% Fldu	cial Limits	<b>;</b>		-		1//	7	
EC01	2.674		1793.61			0.9			₩		,
EC05	3.355					0.8			111		
EC10	3.718	4576.86	3105.36			0.7			#/	l	
EC15	3.964		3523.46			-			Щ	.	
EC20	4.158			6149.93		0.6 - 0.5 0.4 - 0.4			j[]		
EC25	4.326		4230.85			Ž 0.5	i)		111	İ	
EC40	4.747		5185.63			\$ 0.4			18	l	
EC50	5.000	6884.08				1			- 111		
EC60	5.253		6453.94			0.3					
EC75	5.674			• •		.0.2					
EC80	5.842			10963.9	•	0.1				i	
EC85	6.036			12017.7	•	٠.٠٦			/4	İ	
EC90	6.282		-	13547.5		0.0	T-PRITING T		<b>★ /</b> /////	1777	
EC95	6.645			16274.4		1	10	100 1	000 1000	0 10000	
EC99	7:326			23183.6						0	

Dose mg/L

Test ID: 0212-129 Sample ID: BEAZER
Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product
Protocol: EPAA 93-EPA Acute Test Species: CD-Ceriodaphnia dubia

#### Dose-Response Plot



Start Date:

End Date:

Sample Date:

Comments:

12/10/2002

12/12/2002

**BMDSA** 

# Appendix Table C-1b. Water Quality Summary for 48-hour *Ceriodaphnia dubia*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 10 December 2002

Concentration (mg/L)	Rep		mber of Organisr			O g/L)		H units)		ond. ios/cm)	Tem	perature	(°C)	Percer Surviva
(mg/L)		0	24	48	0	48	0	48	0	48	0	24	48	Sulviva
	Α	5	5	5	7.9	8.5	8.09	8.01	192	208	24.2	24.2	24.1	100
Control	В	5	5	5	1 1				r. protect					100
Control	С	5	5	5	Ĺ									100
	D	5	5	5							و دوم ده	i.		100
	Α	5	5	5	7.9	8.5	8.12	8.12	395	405	24.2	24.2	24.1	100
500	В	5	5	5									Land	100
300	C	5	5	5										100
	D	5	4	4									kom a vide kara	80
	Α_	5	5	5	7.9	8.6	8.18	8.16	601	615	24.2	24.2	24.1	100
1,000	В	5	5	5			l j						land.	100
1,000	C	5	5	5				ام د د ده د د د د د						100
	D	5	5	_ 5										100
	Α	5	5	5	7.9	8.4	8.23	8.17	971	982	24.0	24.2	24.1	100
2,000	В	5	_ 5	5										100
2,000	С	5	4	4										80
	۵	5	5	5										100
	Α	5	5	5	7.9	8.5	8.25	8.19	1790	1803	24.0	24.2	24,1	100
4,000	В	5	5	5			į.					المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة الم		100
٦,٥٥٥	С	5	4	4				أواسيد سيد					ا في المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحافظة المحاف المحافظة المحافظة ال	_80
	D	5	5 .	5					h	1	<u> </u>			100
	Α	5	5	4	7.9	8.7	8.23	8.18	3280	3290	24.0	24.2	24.1	80
8,000	В	5	5	3					_		ه د دریواوید وجو	البنية بمحض	الإعدادة والمدامد والم	60
0,000	С	5	5	_2										40
	D	5.	5	3				_						60
	Α	5	4	0	7.9	8.5	8.22	8.16	4020	4140	24.0	24.2	24.1	0
10,000	В	_5	4	0	1	%								0
,0,000	С	5	5	2										40
	D	5	5	0					أند من در در					0

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			]	Daphnia Acute S	urvival Bioa	ssay-48 Hr Surv	rival	
Start Date: End Date: Sample Date: Comments:	12/10/2002 12/12/2002 BMSA		Test ID: Lab ID:	0212-130 AEESD-AMEC E EPAA 93-EPA A	Bioassay SD	Sample ID:	BEAZER Industrial Product CD-Ceriodaphnia dubia	
Conc-mg/L	1	2	3	4	<u> </u>		<del></del>	
L-Lab Control	1.0000	1.0000	1.0000	1.0000				
500	1.0000	1.0000	0.8000	1.0000				
1000	1.0000	1.0000	1.0000	1.0000				
2000	1.0000	1.0000	1.0000	1.0000				
4000	1.0000	1.0000	1.0000	1.0000				
8000	0.2000	0.0000	0.0000	0.0000				
10000	0.0000	0.0000	0.0000	0.0000				

		_	Tra	ansform:	Arcsin So	uare Root	t	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			0	20
500	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	Ö	20
2000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	ō	20
4000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	Ö	20
*8000	0.0500	0.0500	0.2850	0.2255	0.4636	41.771	4	10.00	10.00	19	20
*10000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	-normal dis	tribution	(p <= 0.01)		0.70981	0.896	#######	6.47308
Equality of variance cannot be co	nfirmed				•			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU		· · · · · · · · · · · · · · · · · · ·	·	
Steel's Many-One Rank Test	4000	8000	5656.85				— <u>.</u>	

			Maxi	lmum Likeliho	od-Probit	:				
Parameter	<u>V</u> alue	SE	95% Fiducial Limits	Control	Chi-Sq	Critical	P-value	Mu .	Sigma	iter
Slope	4.133	18.2286	-46.478 54.7438	0	2729.36	9.48773		3.69761	0.24195	9
Intercept	-10.282	68.0448	-199.21 178.641							_
TSCR					1.0 -					
Point	Probits	mg/L	95% Fiducial Limits		-			•/		
EC01	2.674	1363.76			0.9 -				ļ	
EC05	3.355	1993.56	<b>;</b>		0.8 -	1			l	
EC10	3.718	2440.8	<b>;</b>		0.7			- 1	1	
EC15	3.964	2797.94	· •		-	}		- 1		
EC20	4.158	3118.71	•		8esbouse 0.5 0.4 0.4	1		- 1		
EC25	4.326	3423.05	i		<b>요</b> 0.5 -			- 1		
EC40	4.747	4328.23	<b>,</b>		<b>8</b> 0.4	1		- 1	į.	
EC50	5.000	4984.36	<b>;</b>			1		- 1		
EC60	5.253	5739.94	<b>,</b>		0.3 -	i		- 1	1	
EC75	5.674	7257.8	<b>;</b>		0.2 -	1		- 1	ì	
EC80	5.842	7966.06	<b>;</b>		0.1 -	1		- 1		
EC85	6.036	8879.31	ر ا		-	1	•		-	
EC90	6.282	10178.6	•		0.0 -		· · · · · · · · · · · · · · · · · · ·	1 <del>10 ° 0 10 114</del>	TTTTM	
EC95	6.645	12462				1 10	100 1	1000 1000	0 10000	

Dose mg/L

Daphnia Acute Survival Bioassay-48 Hr Survival Test ID: 0212-130 Sample ID: **BEAZER** Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product

Sample Date: Comments: **BMSA** 

Start Date:

End Date:

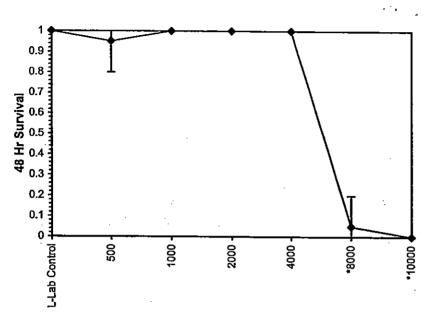
12/10/2002

12/12/2002

Protocol: EPAA 93-EPA Acute

Test Species:

CD-Ceriodaphnia dubia



## Appendix Table C-1c. Water Quality Summary for 48-hour *Ceriodaphnia dubia*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 10 December 2002

		<del></del>			_				· · · · · ·	<del> ·</del>	· · · ·			Т
Concentration (mg/L)	Rep		mber of Organisn			)O g/L)		oH units)		ond. ios/cm)	Tem	perature	(°C)	Percent Survival
(1119/2)		0	24	48	0	48	0	48	0	48	0	24	48	Sulvivai
	Α	5	5	5	7.9	8.5	8.09	8.15	192	212	24.0	24.2	24.1	100
Control	В	5	5	5										100
Condo	С	5	5	5						J.				100
	D	5	5	5										100
	Α	5	5	5	7.9	8.4	7.57	8.14	346	365	24.0	24.2	24.1	100
500	В	5	5	5										100
300	С	5	5	4					<b>#</b>					80
	D	5	5	5		£2				Ä				100
	Α	5	5	5	7.9	8.3	7.44	8.07	504	522	24.0	24.2	24.1	100
1,000	В	- 5	5	5			* 7	11.3						100
1,000	O.	5	5	5				K						100
	Δ	5	5	5							i i i i			100
	Α	.5	5	5	7.9	8.2	7.30	7.95	793	813	24.0	24.2	24,1	100
2,000	В	5	5	5							: :			100
	С	5	5	5										100
	D	5	5	5										100
	Α.	5	5	5	7.8	8.4	7.12	7.76	1387	1428	24.0	24.2	24.1	100
4,000	8	5	5	5			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			ا منتیا ا				100
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	С	5	5	5			الدينسات							100
	D	5	5	5	لِدُونَا اللَّهُ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّهِ اللَّه					<u> </u>				100
	Α	5	5	1	7.9	8.4	6.94	7.49	2500	2560	24.0	24.2	24.1	20
8,000	В	_ 5	5	0								الاختياد ينسب		0
0,000	С	5	5	0								الارداد المستوالية. ولاد مستوالية		0
	D	5	5	0					134					0
1	Α	. 5	3	0	7.8	8.1	6.85	7.36	3060	3280	24.0	24.2	24.1	0
10,000	В	5	2	0	الادارة المناسطة المناسطة المناسطة									0
] '0,000	С	5	4	0	ألتن عبد مدجيد						الديم تبيدير	ال در در در د	أريسينيا	0
	D	5	3	0	None OA OO				, , , , , , , ,					0

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

				Daphnia Acute	Survival Bio	assay-48 Hr Sur	vival
Start Date: End Date:	12/10/2002 12/12/2002		Test ID:	0212-128		Sample ID: Sample Type:	BEAZER
Sample Date:				EPAA 93-EPA		Test Species:	Industrial Product CD-Ceriodaphnia dubia
Comments:	PSA			<del></del>		<del></del>	
Conc-mg/L	1		3	4			·
L-Lab Control	1.0000	1.0000	1.0000	1.0000			
500	1.0000	1.0000	1.0000	0.8000			
1000	1.0000	1.0000	1.0000	1.0000			
2000	1.0000	1.0000	0.8000	1.0000			
. 4000	1.0000	1.0000	0.8000	1.0000			
8000	0.8000	0.6000	0.4000	0.6000			
10000	0.0000	0.0000	0.4000	0.0000			

		,	Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Mln	Max	CV%	N	- Sum	Critical		Number
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			0	20
500	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	Ó	20
2000	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20
4000	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20
*8000	0.6000	0.6000	0.8910	0.6847	1.1071	19.366	4	10.00	10.00	8	20
*10000	0.1000	0.1000	0.3403	0.2255	0.6847	67.468	4	10.00	10.00	18	20

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal dis	stribution	$(p \le 0.01)$		0.87706	0.896	0.54666	1.8502
Equality of variance cannot be co	nfirmed	1				-		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU.				
Steel's Many-One Rank Test	4000	8000	5656.85				· ·	

		-			* *						
			· · · ·	Maxi	mum Likeliho	od-Probl		:		· ·	
<u>Parameter</u>	Value	SE	95% Fldu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	iter
Slope	2.57412	1.86521	-2.6046	7.75279	0	50.624	9.48773			0.38848	6
Intercept	-4.9744	6.9907	-24.384	14.4349	٠.	•		۸.			
TSCR						1.0 -		<u> </u>			
Point	Probits	mg/L	95% Fldu	cial Limits		-	,			7	
EC01	2.674	935.719				0.9 -	•		•	/	
EC05	3.355	1721.45	;	•		0.8 -	1		1		
EC10	3.718	2382:49	)			0.7 -	1		- 1		
EC15	3.964	2966.57	•		•	-			- 1	ļ.	
EC20	4.158	3531.31				စ္တ 0.6 -	<b>)</b>	-	- 1		
EC25	4.326	4100.75	;	÷		esbouse 0.5 - 0.0 0.4 - 1.0		-	- 1		
EC40	4.747	5976.82	)			<u>v</u> 0.4 -	1				
EC50	5.000	7497.07	•	•			1				•
EC60	5.253	9404	,			0.3 -	i		- 1		
EC75	5.674	13706.3	}			0.2 -	-		- /	1	
EC80	5.842	15916.5		•		0.1 -	1		- /		
EC85	6.036	18946.5	;			-	{	•	· /• •		
EC90	6.282	23591.3				0.0 -		**************************************	- 1 1 1 1 mag	* ******	
EC95		32650.4	,			•	1 10	100 1	1000 1000	-	
FOOD		00007.0								0	

Dose mg/L

Daphnia Acute Survival Bioassay-48 Hr Survival

Start Date: End Date:

12/10/2002

12/12/2002

Test ID: 0212-128

Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Sample ID:

BEAZER Industrial Product

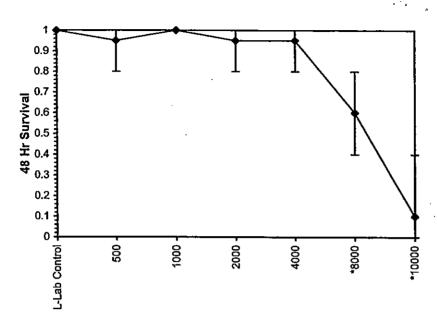
Sample Date: Comments:

**PSA** 

Protocol: EPAA 93-EPA Acute

**Test Species:** 

CD-Ceriodaphnia dubia



Ceriodaphnia dubia
Chronic Exposure

### 

## Water Quality Summary for 7-day *Ceriodaphnia dubia* Exposure to Benzene Metadisulfonic Acid (BMDSA)

### Initiated: 10 December 2002

Concentration	Lab Control										
Day	0	1	2	3	4	5	6	7			
		· · · · · · · · · · · · · · · · · · ·			tia.						
pН	8.09	8.19	7.91	8.47	8.26	8.14	8.16				
DO (mg/L)	7.9	7.7	8.2	8.0	8.4	7.9	8.0				
Cond. (µmhos-cm)	_192	195	200	196	195	194	195				
Temp (°C)	24.0	24.5	25.0	24.0	24.2	24.3	24.4				
				Fi	nat						
pH		7.89	7,97	7.85	7.98	7.96	8.62	7.79			
DO (mg/L)		7.3	8.3	8.0	8.4	8.0	8.1	7.8			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	500 mg/L											
Day	0	1	2	3	4	5	6	7				
				Ini	tial							
рH	8.21	8.26	8.14	8.47	8.34	8.28	8.30					
DO (mg/L)	7.9	7.9	8.1	7.8	8.3	7.8	8.0					
Cond. (µmhos-cm)	494	473	498	498	484	466	454					
Temp (°C)	24.0	24.0	25.0	24.2	24.3	24.3	24.4					
				######################################								
рH		7.94	8.04	7.89	8.10	8.07	8.30	7.90				
DO (mg/L)		7.3	8.4	8.0	8.2	8.1	8.0	7.7				
Temp (°C)		24.2	24.4	24.6	24.2	24.3	24.5	24.8				

Concentration	1,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				fe)	tial						
рH	8.25	8.31	8.23	8.44	8.34	8.34	8.34				
DO (mg/L)	7.9	7.9	8.2	7.8	8.3	7.9	8.0				
Cond. (µmhos-cm)	731	789	823	806	783	767	782				
Temp (°C)	24.0	24.0	25.1	24.2	24.3	24.3	24.8				
				i	nal						
pH		7.97	8.06	7.97	8.12	8.13	8.15	7.95			
DO (mg/L)		7.3	8.3	7.9	8.2_	8.1	7.7	7.6			
Temp (°C)		24.2	24.1	24.6	24.2	24.0	24.5	24.8			

Concentration				2,000	mg/L			
Day	0	1	2	3	4	5	6	7
				lai	(ia)			
pH	8.26	8.34	8.27	8.40	8.35	8.32	8.36	
DO (mg/L)	7.9	7.9	8.2	8.0	8.3	7.9	7.7	
Cond. (µmhos-cm)	1375	1381	1430	1405	1371	1350	1378	
Temp (°C)	24.0	24.0	25.1	24.4	24.3	24.2	24.9	
					tal			
pН		8.01	8.08	8.00	8.14	8.14	8.10	7.99
DO (mg/L)		7.5	8.3	8.0	8.3	8.1	7.7	7.6
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8

Concentration	4,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				lni	tlal						
На	8.26	8.34	8.29	8.39	8.35	8.38	8.37				
DO (mg/L)	7.9	7.9	8.2	7.9	8.3	7.9	7.8				
Cond. (µmhos-cm)	2490	2500	2600	2530	2490	2460	2470				
Temp (°C)	24.0	24.0	25.0	24.5	24.2	24.0	25.5				
				Fi	ıal						
pН		8.03	8.11	8.01	8.14	8.16	7.88	8.00			
DO (mg/L)		7.5	8.4	7.8	8.1	8.1	7.8	7.5			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	8,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				lni	tial						
pН	8.25	8.33	8.27	8.36	8.35	8.42	_NR				
DO (mg/L)	7.9	7.9	8.3	8.0	8.4	8.0	NR				
Cond. (µmhos-cm)	4720	4590	4750	4680	4500	4430	NR				
Temp (°C)	24.0	24.0	25.1	24.7	24,1	24.0	NR				
					ial						
рН		8.10	8.09	8.06	8.18	NR	NR	NR			
DO (mg/L)		8.0	8.2	8.1	8.5	NR	NR	_NR			
Temp (°C)		24.2	24.1	24.6	24,2	NR	NR	NR			

Concentration	10,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				lni	tial						
рН	8.24	8.31	8.26	8.32	8.33	NR	NR				
DO (mg/L)	7.9	8.0	8.3	8.1	8.2	NR	NR				
Cond. (µmhos-cm)	5700	5580	5810	5800	5580	NR	NR				
Temp (°C)	24.0	24.0	25.0	25.2	24.1	NR	NR				
				5	18i						
pН		8.09	8.09	8.07	NR	NR	NR	NR			
DO (mg/L)		7.9	8.3	8.1	NR	NR	NR	NR			
Temp (°C)		24.2	24.1	24.6	NR	NR	NR	NR			

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Notes: NR = not recorded because all organisms in that concentration were dead

## Appendix Table C-3a. Water Quality Summary for 7-day *Ceriodaphnia dubia*Exposure to Benzene Metadisulfonic Acid (BMDSA)

### Initiated: 10 December 2002

Conc.	Rep		Dal	ly Repr	oductio	n/ Sun	/Ival		Total
(mg/L)	Keb	1		3 1	4	- 5	6	7	1 Ocai
-	1	0	0	0	5	15	19	а	39
	2	0	0	0	8	14	0	а	22
	3	0	0	0	в	13	24	а	43
<u>_</u>	4	0	0	0	7	12	22	a ·	41
) d	5	0	0	0	4	9	12	8	25
Lab Control	6	0	0	7	14	Ö	23	а	44
₫	7	0	0	6	12	0/d	-	-	18/d
	8	0	0	. 7	13	0	19	а	39
	9	0	0	0	7	12	22	а	41
	10	٥	0	5	0	15	21	а	41

Conc.	Bon		Dal	ly Repr	oductic	n/ Surv	ival		Total
(mg/L)	Rep	4	2	3	4	Б	6	7	1000
	1	0	0	5	0	13	20	a	38
	2	0	0 .	0	6	13	18	æ	37
	3	0	0	6	12	0	19	а	37
	4	0	0	LIP	-	-		1	먑
500	5	0	0	5	13	0	20	a	38
8	6	0	0	1	2	13	18 .	а	34
	7	O	, 0	0	9	13	21	а	43
	8	0	0 -	6	12	17	24	a	59
	9	0	0	0	6	10	14	а	30
	10	0	0	0	8	15	16	а	37

Conc.	<b>D</b>		Dai	ly Repr	oductio	n/ Sur	Ival		Total
(mg/L)	Rep		2	3	4	6	6	7	rotai
	1	0	0	В	0	13	19	а	38
	2	0	0	8	0	14	20	а	42
	3	0	0	0	11	17	16	a	44
	4	٥	0	7	2	12	18	а	39
1,000	5	0	0	6	14	0	16	a	36
8	6	٥	0	7	14	0	18	8	39
	7	0	0	6	15	0	17	a	38
·	8	0	0	4	15	0	19	8	38
	9	0	0	5	12	0	21	а	38
	10	0	0	8	0	11	16	a	33

Conc.			Dal	iy Repr	oductio	on/ Sur	vival		Total
(mg/L)	Rep		2	3	4	5	6		
	1	0	0	6	0	9	15	а	30
	2	0	0	7	0	13	24	d	44/d
	3	0	0	0	7	5	2	а	14
	4	0	0	5	0	9	15	а	29
2,000	5	0	LIP		-	_			LIP
Š	6	0	0	6	0	9	17	а	32
	7	0	0	5	13	0	18	а	36
	8	0	0	8	0	11	19	d	38/d
	9	0	0	5	10	3	17	d	35/d
	10	0	0	6	0	13	15	a	34/d

Conc.	Rep		Dai	ly Repr	oductio	on/ Sun	/lval		Total
(mg/L)	Kep		2	3	4	5	6	7	10tal
	1	0	0	0	4	4	Ò	а	8
	2	0	0	0	3	3	5.	а	11
	3	0	0	0	3	5	5	а	13
	4	0	0	3	0	7	4	а	14
4,000	5	0	0	0	3	5	0	а	8
8	6	0	0	3	0	7	4	а	14
l	7	0	0	5	0	7	4	Ф	16/d
	8	0	0	0	3	3	5	а	11
	9	0	0	3	0	10	0	d	22/d
	10	0	0	0	2	3	0	d	5/d

Conc.	Rep		Dal	ly Repr	oductio	on/ Surv	/Ival		Total
(mg/L)	Keb		2		4	3	6		10001
	1	0	0/d	-		-	-	_	0/d
	2	0	0	0	0	0/d	1	-	0/d
	3	0	0	0/d	1	-	-	-	0/d
	4	0	0	0/d	-	-	1		0/d
8,000	5	0	0	0/d	1		-	1	0/d
8	6	0	0	0	0/d	-	••	-	0/d
	7	0	0	0/d	1	-	1	-	0/d
	8	0	0/d		1	1	ŀ	-	0/d
	9	0	0	0/d	-	-	-		0/d
	10	0	0	0/d	-		-	**	0/d

Conc.	Ban		Dal	ly Repr	oductio	on/ Sur	vival		Total
(mg/L)	Rep		2	3	4	Б	6	7	· ota
	1	0	0_	0/d	-	-	_	-	0/d
	2	0	0	0/d	_	_	-	- ,	0/d
	3	0	0	0/d	1	-	-	-	0/d
1	4	٥	0	0/d		-	-	1	0/d
10,000	5	٥	0/d		_	_	-	1	0/d
8	6	0	0	0/d	-		-	1	0/d
	7	0	0/d	_			-	1	0/d
	8	0	0	0/d	ı	11	ļ	1	0/d
	9	0	0/d		-	-	••	-	0/d
	10	0	0	0/¢			-	-	0/d

AMEC Bioassey Laboratory - 5550 Morehouse Dr., Suite B. San Diego, CA 92121,

Notes: d = organism dead

a = organism alive, reproductive counts not taken because lest acceptability criteria were met on day 6.

LIP = organism lost in process, excluded from statistical analysis

<del></del>			Cerioda	aphnia Sui	vival and	l Reprod	<u>uction</u> Tes	t-7 Day S	Survival	
Start Date:	12/10/2002	-	Test ID:	0212-209			Sample ID	:	BEAZER	
End Date:	12/17/2002	,	Lab ID:	AEESD-AI	MEC Bioa	ssay SD	Sample Ty	/pe:	Industrial I	Product
Sample Date:				EPAF 94-6					CD-Ceriod	laphnia dubia
Comments:	BMDSA						•			•
Conc-mg/L	1	2	3	4	5	6	7	8	9	10
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1:0000	1.0000	1.0000
500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	
4000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	0.0000	0.0000
8000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

				Not			Fisher's	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	Resp	Number
L-Lab Control	0.9000	1.0000	1	9	10	10	-		1	10
500	1.0000	1.1111	0 、	9	9	9	0.5263	0.0500	0	9
1000	1.0000	1.1111	0	10	10	10	0.5000	0.0500	0	10
2000	0.5556	0.6173	4	5	9	9	0.1192	0.0500	4	9
4000	0.7000	0.7778	3	7	10	10	0.2910	0.0500	3	10
*8000	0.0000	0.0000	10	0	10	10	0.0001	0.0500	10	10
*10000	0.0000	0.0000	1Ó	0	10	10	0.0001	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	
Fisher's Exact Test	4000	8000	5656.85	,	

			•	Maxir	num Likeliho	od-Probit	:				
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Ite
Slope	4.015	1.13494	1.79052	6.23949	0.1	9.47961	9.48773	0.05	3.54078	0.24907	8
ntercept	-9.2162	4.12763	-17.306	-1.1261							
TSCR	0.0444	0.04249	-0.0389	0.12767		1.0 ¬				<del></del>	
Point	Probits	mg/L	95% Fidu	cial Limits		4			- 17		
EC01	2.674	914.879	120.096	1705.48		0.9 -			- 11 /		
EC05	3.355	1352.39	283.58	2231.19		0.8 -	,		/ <b>]</b> /_		
EC10	3.718	1665.66	446.152	2587.37		0.7			- ///		
EC15	3.964	1917.07	603.747	2868.6		. 4			- ///	ŀ	
EC20	4.158	2143.67	765.727	3122.31		9Su 0.6			- / <b>I</b> I		
EC25	4.326	2359.31	936.421	3366.72		0.6 - 0.5 - 0.4 - 0.4 - 0.4			- / <b>/</b> /		
EC40	4.747	3003.84	1528.22	4141.88		<b>9</b> 0.4					
EC50	5.000	3473.58	2011.82	4785.09		0.3	ĺ		/*//		
EC60	5.253	4016.78	2584.93	5664.07		-			/ [[	,	
EC75	5.674	5114.11	3646.78	8060.7		0.2 -			/ / [ ]		
EC80	5.842	5628.55	4076.67	9508.34		0.1	1	/	' H +	i	
EC85	6.036	6293.87	4577.26	11690.4	•	-	[	/,	<i>Z</i> /		
EC90	6.282	7243.83	5212.6	15401.5		0.0 -	4 40	400 4	1000 4000	**************************************	
EC95	6.645	8921.84	6192.38	23653.2		•	1 . 10	100 1	1000 1000	0 10000 0	
EC99	7.326	13188.4	8278.54	54655.2			•	Dose m		U	

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date: End Date: Sample Date:

Comments:

12/10/2002

12/17/2002

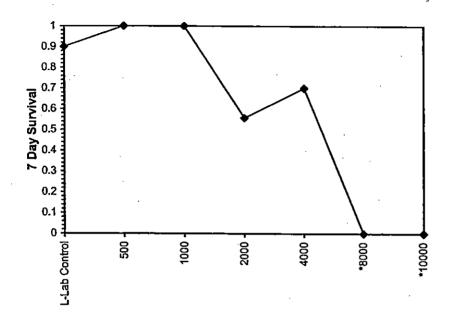
**BMD\$A** 

Test ID: 0212-209

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Protocol: EPAF 94-EPA Freshwater Cr Test Species:

BEAZER Industrial Product CD-Ceriodaphnia dubia



		_	Cerioda	phnia Su	rvival and	Reprodu	ction Tes	st-Repro	duction	<del></del>
Start Date:	12/10/2002	<u> </u>	Test ID:	0212-209		,	Sample ID	):	BEAZER	
End Date:	12/17/2002	<u> </u>	Lab ID:	AEESD-AI	MEC Bioas	ssay SD 3	Sample Ty	ype:	Industrial I	Product
Sample Date:			Protocol:	EPAF 94-E	EPA Frest	water Cr	Test Spec	ies:	CD-Cerioo	laphnia dubia
Comments:	BMDSA									
Conc-mg/L	1	2	3	4	5	6	7	8	9	10
L-Lab Control	39.000	22.000	43.000	41.000	25.000	44.000	18.000	39.000	41.000	41.000
500	38.000	37.000	37.000	38.000	34.000	43.000	59.000	30.000	37.000	
1000	38.000	42.000	44.000	39.000	36.000	39.000	38.000	38.000	38.000	33.000
2000	30.000	44.000	14.000	29.000	32.000	36.000	38.000	35.000	34.000	
4000	8.000	11.000	13.000	14.000	8.000	14.000	16.000	11.000	22.000	5.000
8000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

		_	•	Transforn	n: Untran	Untransformed			1-Tailed			
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	- Sum	Critical	Mean	N-Mean	
L-Lab Control	35.300	1.0000	35.300	18.000	44.000	27.402	10	-		35.300	0.0000	
500	39.222	1.1111	39.222	30.000	59.000	20.861	9	84.50	60.00	39.222	-0.1111	
1000	38.500	1.0907	38.500	33.000	44.000	7.768	10	98.50	73.00	38.500	-0.0907	
2000	32.444	0.9191	32.444	14.000	44.000	25.422	9	75.50	60.00	32.444	0.0809	
*4000	12.200	0.3456	12.200	5.000	22.000	39.367	10	56.50	73.00	12.200	0.6544	
*8000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	73.00	0.000	1.0000	
*10000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	73.00	0.000	1.0000	

Auxiliary Tests		_			Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates nor	ı-normal dis	stribution	(p <= 0.01)		1.50477	1.035	-0.3299	3.70045
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Wilcoxon Rank Sum Test	2000	4000	2828.43				<del></del>	-

				Maxir	num Likeliho	od-Probit			•		
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Ite
Slope	6.12449	1.19342	3.78539	8.46358	. 0	8.78778	9.48773	0.07	3.53602	0.16328	4
Intercept	-16.656	4.26092	-25.008	-8.3049							
TSCR		•			•	1.0 -				<del></del> ;	
Point	Probits	mg/L	95% Fidu	cial Limits		0.9 -			- 17	}	
EC01	2.674	1432.76	787.905	1883.17		0.9				1	
EC05	3.355	1851.17	1188.12	2275.4		0.8 -					
EC10	3.718	2122.1	1477.02	2520.17		0.7 -	1		- 1	ļ	
EC15	3.964	2326.96	1708.99	2702.67		-			#	j	
EC20	4.158	2503.78	1917.32	2859.7		<b>95</b> 0.6 -	[		ı		
EC25	4.326	2666.16	2114.1	3004.61		9.6 - 0.5 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 - 0.4 -	1		.		
EC40	4.747	3123.56	2683.4	3429.59		S 0.4	1		1		
EC50	5.000	3435.71	3063.47	3754.69			ł		/[		
EC60	5.253	3779.05	3443.48	4174.96		0.3 -	1		11		
EC75	5.674	4427.37	4029.29	5169.35		0.2 -	1		///		
EC80	5.842	4714.49	4252.87	5673.89		0.1 -	1				
EC85	6.036	5072.75	4515.4	6343.78			1		.27		
EC90	6.282	5562.45	4855.18	7320.73		0.0 -	<del>                                     </del>	111111 T 1	1000 1000		
EC95	6.645	6376.55	5389.18	9081.07		,	1 10	100 1	1000 1000		
EC99	7.326	8238.72	6523.54	13668.8				_		0	
								Dose m	ıg/L		

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: End Date:

12/10/2002 12/17/2002 Test ID: 0212-209

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type:

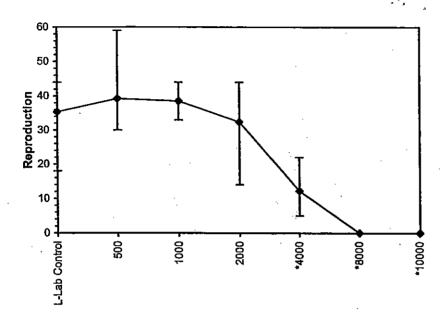
BEAZER Industrial Product

Sample Date: Comments:

**BMDSA** 

Protocol: EPAF 94-EPA Freshwater Ch Test Species:

CD-Ceriodaphnia dubia



#### parametricity).

### Water Quality Summary for 7-day Ceriodaphnia dubia Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 10 December 2002

Concentration	Lab Control										
Day	0	1	2	3	4	5	6	7			
				n	tial						
Нq	8.09	8.19	8.25	8.20	8.17	8.03	8.10				
DO (mg/L)	7.9	7.7	7.9	7.9	8.3	8.3	8.0				
Cond. (µmhos-cm)	192	20	199	194	194	197	212				
Temp (°C)	24.0	24.5	25.4	24,3	24.3	24.5	24.4				
				- Fi	rel						
pН		7.76	7.96	7.89	7.97	7.82	7.74	7.77			
DO (mg/L)		7.3	8.2	8.2	8.3	7.8	8.0	7.5			
Temp (°C)	1	24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	]			500	mg/L			
Day	0	1	2	3	4	5	6	7
					tia			
рН	8.12	8.08	8.29	8.28	8.25	8.16	8.21	
DO (mg/L)	7.9	7.8	7.8	7.9	8.3	8.0	8.0	
Cond. (µmhos-cm)	395	395	411	389	390	378	377	
Temp (°C)	24.0	24.5	26.0	24.4	24.3	24.5	24.6	
				Fi				
pH		7.87	8.02	7.97	8.03	7.96	7.96	7.88
DO (mg/L)		7.4	8.3	8.0	8.2	8.1	8.2	7.6
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8

Concentration	1,000 mg/L											
Day	0	1	2	3	4	5	6	7_				
				in)	tial							
pH	8.18	8.27	8.30	8.31	8.27	8.25	8.28					
DO (mg/L)	7.9	7.8	7.8	7.9	8.3	7.9	8.0					
Cond. (µmhos-cm)	601	612	648	605	584	586	587					
Temp (°C)	24.0	24.8	26.0	24.6	24.3	24.5	24.6					
					nai							
pН		7.92	8.07	8.04	8.06	8.09	8.05	7.92				
DO (mg/L)		7.4	8.2	8.0	8.2	8.1	8.4	7.7				
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8				

Concentration	2,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				in i	tial						
рH	8.23	8.31	8.33	8.32	8.29	8.30	8.31				
DO (mg/L)	7.9	7.9	7.8	8.0	8,3	8.0	7.9				
Cond. (umhos-cm)	971.	1022	1075	1021	971	963	1004				
Temp (°C)	24.0	24.8	26.0	24.8	24.2	24.5	25.2				
				FI	nal						
рH		7.96	8.09	8.06	8.08	8.14	8.10	7.96.			
DO (mg/L)	1	7.3	8.2	8.0	8.0	8.1	8.2	7.7			
Temp (°C)	1	24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	4,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				in i	uai						
рH	8.25	8.34	8.29	8.31	8.29	8.35	8.34				
DO (mg/L)	7.9	7.9	8.1	7.9	8.4	8.0	7.8				
Cond. (µmhos-cm)	1790	1812	1864	1811	1756	1700	1781				
Temp (°C)	24.0	24.6	26.0	24.9	24.1	24.3	25.4				
				F∣	ial						
рН		7.99	8.13	8.09	8.10	8.14	8.15	8.00			
DO (mg/L)		7.5	8.2	7.9	8.0	8,1_	8.5	7.7			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	8,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				lhi	tial						
рН	8.23	8.32	8.27	8.29	8.29	NR	NR				
DO (mg/L)	7.9	8.0	8.1	8.0	8.4	NR_	NR				
Cond. (µmhos-cm)	3280	3270	3390	3360	3190	NR_	NR				
Temp (°C)	24.0	24.3	26.0	25.0	24.1	NR	NR				
					jal.						
pН		8.06	8.13	8.12	NR	NR	NR	NR			
DO (mg/L)		7.7	8.2	8.1	NR	NR	NR	NR			
Temp (°C)		24.2	24.1	24.6	NR	NR	NR	NR			

Concentration	10,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				in	tial						
рН	8.22	8.30	8.25	NR	NR	NR	NR				
DO (mg/L)	7.9	8.0	8.2	NR	NR	NR .	NR				
Cond. (µmhos-cm)	4020	4020	4100	NR	NR	NR	NR				
Temp (°C)	24.0	24.1	25.5	NR	NR	NR	NR				
					(1:18						
рН		8.09	8.11	NR	NR	NR	NR	NR			
DO (mg/L)		7.8	8.2	NR	NR	NR	NR	NR			
Temp (°C)		24.2	24.1	NR .	NR	NR	NR	NR			

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

Notes: NR = not recorded because all organisms in that concentration were dead

# Appendix TableC-3b. Water Quality Summary for 7-day *Ceriodaphnia dubia*Exposure to Benzene Monosulfonic Acid (BMSA)

### Initiated: 10 December 2002

Conc.	Rep		Dal	ly Repr	oductio	on/ Sur	/[val		Total
(mg/L)	wah	1	2		4		6	7	10001
	1	0	0	0	6	12	19	а	37
2	2	0	0	7	0	14	16	а	37
	3	0	0	7	0	13	17	а	37
P	4	0	0	5	0	11	18	а	34
D C	5	0	0	7	٥	13	21	а	41
Lab Control	6	0	0	6	11	0	21	а	38
호	7	0	0	6	0	17	24.	а	47
	8	0	0	6	12	0	22	а	40
	9	0	0	5	12	0	20	а	37
	10	0	0	0	6	14	15	а	35

Conc.	Ban		Dal	ly Repr	oductio	n/ Sur	/Ival		Total
(mg/L)	rep.		2	9	4	5	6	7	10001
	1	0	0	4	0	9	18	а	31
	2	0	0	7	0	10	18	а	35
	3	0	0	6	9	3	19	a	37
	4	0	0	8	13	0	23	а	44
2,000	5	0	0	3	9	0	12	а	24
00	6	0	0	4	0	10	13	а	27
	7	ō	0	3	9	0	18	а	30
	8	0	0	4	0	12	13	а	29
	9	0	0	2	10	٥	11	а	23
	10	0	0	0	4	11	19	a	34

Conc.	Rep		Dai	ly Repr	oductio	on/ Sur	vival		Total
(mg/L)	web		2	3	4	5	6	7	TOUR
[	1	0	0/d		-	-	-		0/0
	2	0	0	0/d	_			-	0/d
	3	0	0	0/d		_	1		0/d
	4	0	0	0/d	-	-	-		0/d
8,000	5	0	0/d	_	1	-	1	-	0/d
8	6	0	0/d		1	_		-	0/d
	7	Q	0/d	_	-				0/d
	8	0	0/d	-	-		ı	-	0/d
	9	0	0	0/d	1			**	0/d
	10	0	0/d	-	-		_		0/d

Conc.	Ban		Dal	ly Repr	oductio	on/ Sun	/ival		Total
(mg/L)	Rep		2	3	4	ō	6	7	TOLAI
	1	0	0	0	8	12	16	а	. 36
	2	0	0	8	8	2	22	а	38
	3	0	0	5	12	0	21	а	38
	4	0	0	3	13	0	19 .	а	35
500	5	0	0	6	0	11	21	а	38
ĕ	6	0	Q -	4	12	0	18	а	34
	7	0	0	6	11	.0	21	. a	38
	8	0	0	5	0	10	22	а	37
	9	0	0	4	14	Ö	21	а	39
	10	0	0	6	12	0	22	a	40

Conc.	Rep		Dai	ly Repr	oductio	on/ Sur	/Ival		Total
(mg/L)	Meh		2	3	4	5	6	7	1000
	1	0	0	0	3	4	0	а	7
	2	0	0	3	0	4	2	а	9
	3	0	0	0	3	4	9	а	16
	4	0	0	0	0	0	3	а	3
4,000	5	0	0	2	0	3	4	а	9
8	9	0	0	5	10	0	15	а	20
	7	0	0	0/d	t	1	ı	-	0/d
	8	0	LIP	1	1	-	1	1	LIP
	9	0_	0	3	0	8	8	đ	19
	10	0	0	4	9	0	9	d	22

Conc.	Rep		Dai	ly Repr	oductio	n/ Sur	vival		Total
(mg/L)	Web		2	3	4	5	6	7	i G
	1	0	0/d	-					0/d
	2	0	0/d	-	-	-		-	0/d
	3	0	0/d	1	1	ı	_		0/d
	4	0	0/d	ı			-		0/d
10,000	5	0	0/d	1	1	1	1	-	0/d
8	6	0	0/d	1		-		-	0/d
	7	0	0/d	1	1	1	1		0/d
	8	0	0/d	. 1		1	1	1	0/d
	9	0	0/d	1		4	1	-	0/d
	10	0	0/d			-	-	-	0/d

Conc.	Rep		Dal	y Repr	oductio	n/ Sur	/lval		Total
(mg/L)	Keh	*		3			6	7	
	1	0	0	0	5	13	17	а	35
Ī	2	٥	0	3	0	10	19	а	32
	3	٥	0	0	6	12	21	а	39
	4	0	0	3	13	0	17	a.	33
1,000	5	0	0	4	13	0	15	a	32
8	6	0	0	7 `	12	0	20	а	39
	7	0	0	4	8	0	24	a	37
	8	0	0	3	10	0	11	а	24
	9	0	0	5	12	0	21	а	38
	10	0	0	5	0	12	15	а	32

AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B. San Diego, CA 92121.

Notes: d = organism dea

a = organism alive, reproductive counts not taken because test acceptability criteria were met on day 6.

LIP = organism lost in process, excluded from statistical analysis

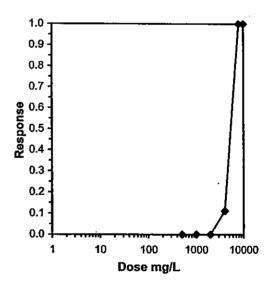
	· · - · · · · · · · · · · · · · ·		Cerioda	phnia Sur	vival and	Reprodu	ction Tes	t-7 Day	Survival			
Start Date:	12/10/2002		Test ID:	Test ID: 0212-210 Sample ID: BEAZER								
End Date:	12/17/2002		Lab ID:	AEESD-AI	MEC Bioas	ssay SD	Sample Ty	pe:	Industrial I	Product		
Sample Date:				EPAF 94-E					CD-Cerioo	laphnia dubia		
Comments:	BMSA						•					
Conc-mg/L	1	2	3	4	5	6	7	8	9	10		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1,0000		
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
2000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
4000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000			
8000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000		
10000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000		

				Not			Fisher's	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	0	10	10	10			0	10
500	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
1000	1.0000	1.0000	0	10	10	10	1.0000	0.0500	Ō	10
2000	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
4000	0.8889	0.8889	1	8	9	9	0.4737	0.0500	1	9
*8000	0.0000	0.0000	10	. 0	10	10	0.0000	0.0500	10	10
*10000	0.0000	0.0000	10	0	10	10	0.0000	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	
Fisher's Exact Test	4000	8000	5656.85		

Trimmed Spearman-Karber

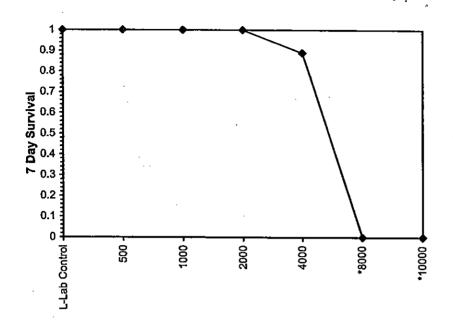
Trim Level	EC50	95%	CL
0.0%	5237.54	4529.58	6056.15
5.0%	5356.02	4485.18	6395.94
10.0%	5414.74	4200.59	6979.83
20.0%	5417.02	4941.39	5938.43
Auto-0.0%	5237.54	4529.58	6056.15



Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date: 12/10/2002 Test ID: 0212-210 Sample ID: BEAZER
End Date: 12/17/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product
Sample Date: Protocol: EPAF 94-EPA Freshwater Cl Test Species: CD-Ceriodaphnia dubia

Comments: BMSA



Start Date:	12/10/2002	2		aphnia Su 0212-210			Sample ID		BEAZER	
End Date:	12/17/2002	2	Lab ID:	AEESD-AI	MEC Bioa	ssay SD 🤄	Sample Ty	/pe:	Industrial I	Product
Sample Date:			Protocol:					•	CD-Cerio	laphnia dubia
Comments:	BMSA						•			
Conc-mg/L	1	2	3	_ 4	5	6	7	8	9	10
L-Lab Control	37.000	37.000	37.000	34.000	41.000	38.000	47.000	40.000	37.000	35.000
500	36.000	38.000	38.000	35.000	38.000	34.000	38.000	37.000	39.000	40.000
1000	35.000	32.000	39.000	33.000	32.000	39.000	37.000	24.000	38.000	32.000
2000	31.000	35.000	37.000	44.000	24.000	27.000	30.000	29.000	23.000	34.000
4000	7.000	9.000	16.000	3.000	9.000	20.000	0.000	19.000	22.000	
8000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

		_		Transforn	n: Untran	sformed		Rank	1-Tailed		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
L-Lab Control	38.300	1.0000	38.300	34.000	47.000	9.617	10			38.300	0.0000
500	37.300	0.9739	37.300	34.000	40.000	4.903	10	103.50	73.00	37.300	0.0261
1000	34.100	0.8903	34.100	24.000	39.000	13.435	10	81.00	73.00	34,100	0.1097
*2000	31.400	0.8198	31.400	23.000	44.000	20.209	10	70.00	73.00	31,400	0.1802
*4000	11.667	0.3046	11.667	0.000	22.000	67.491	9	45.00	60.00	11.667	0.6954
*8000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	73.00	0.000	1.0000
*10000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	73.00	0.000	1.0000

Auxiliary Tests	Statistic	Critical	Skew Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.52155	1.035	0.14608 1.89091
Equality of variance cannot be confirmed			
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV	TÜ		

Wilcoxon Rank Sum Test 1000 2000 1414.21

				Max	imum Likeliho	od-Probit					
<u>Parameter</u>	Value	SE	95% Fidu	cial Limits	Control	Chl-Sq	Critical	P-value	Mu	Sigma	lter
Slope	4.58383	0.74427	3.12507	6.0426	0	3.86857	9.48773	0.42	3.48832	0.21816	7
Intercept	-10.99	2.59813	-16.082	-5.8975							
TSCR	_					1.0 -					
Point	Probits	mg/L	95% Fidu	cial Limits		-			- 17/	ĺ	
EC01	2.674	956.762	544.659	1292.45		0.9 -			/	j	
EC05	3.355	1347.34	893.206	1688.26		0.8 -			/	1	
EC10	3.718	1617.09	1159.5	1952.08		0.7			Ш		
EC15	3.964	1828.98	1379.8	2157.52		-			П	ł	
EC20	4,158	2017.01	1581.27	2340.69		0.6 0.5 0.4 0.4	-				
EC25	4.326	2193.66	1773.73	2515.37		0.5			111		
EC40	4.747	2710.48	2334.53	3060.19		8 0.4 -	1		#		
EC50	5.000	3078.33	2709.43	3499.98			1		//		
EC60	5.253	3496.11	3096.48	4065.1		0.3 -	1		///		
EC75	5.674	4319.77	3764.17	5354.62		0.2 -			Ш		
EC80	5.842	4698.09	4044.38	6007.38		0.1	1		<b>√</b> [		
EC85	6.036	5181.09	4387.14	6885.48			l	•	]]	l	
EC90	6.282	5859.98	4848.29	8194.61		0.0 -		***************************************	rai T T T T T T T T T T T T T T T T T T T		
EC95	6.645	7033.2	5605.34	10638.8		•	1 10	100 1	000 1000		
EC99	7.326	9904.36		17448.5						0	

Dose mg/L

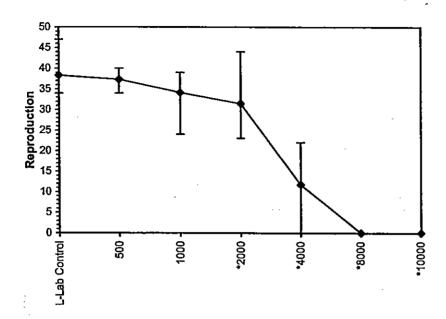
Ceriodaphnia Survival and Reproduction Test-Reproduction

Test ID: 0212-210 Sample ID: BEAZER

Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product

Protocol: EPAF 94-EPA Freshwater Cl Test Species: CD-Ceriodaphnia dubia

### Dose-Response Plot



Start Date:

End Date:

Comments:

Sample Date:

12/10/2002

12/17/2002

**BMSA** 

### Water Quality Summary for 7-day *Ceriodaphnia dubia*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 10 December 2002

Concentration	Lab Control										
Day	0	1	2	3	4	5	6	7			
				Ini	tial						
рH	8.09	8.19	8.08	8.21	8.13	8.14	8.10				
DO (mg/L)	7.9	7.7	8.1	7.9	8.4	7.9	8.0				
Cond. (µmhos-cm)	192	195	206	194	214	194	204				
Temp (°C)	24.0	24.5	25.2	24.6	24.0	24.3	24.5				
					121						
pH		7.92	7.91	7.95	7.91	7.99	7.98	7.76			
DO (mg/L)		7.4	8.3	8.0	8.1	7.9	8.2	7.6			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

remp (*C)	***********	24.2	24.1	24.5	24.2	24.3	24.5	24.8			
Concentration	500 mg/L										
Day	0	1	2	_ 3	4	5	. 6	7			
				į,	(la)						
pH	7.57	7.63	7.75	7.65	7.53	7.59	7.69				
DO (mg/L)	7.9	7.8	8.1	7.9	8.3	7.9	7.8				
Cond. (µmhos-cm)	346	337	354	341	459	335	334				
Temp (°C)	24.0	24.7	25.6	24.6	24.2	24.3	24.8				
				#I	nal						
pН		7.99	7.95	8.01	7.89	8.04	8.10	7.77			
DO (mg/L)		7.3	8.3	8.0	8.0	7.9	8.0	7.4			
Temp (°C)		24.2	24,1	24.6	24.2	24.3	24.5	24.8			

-Concentration	1,000 mg/L										
Day	0	]1	2	3	4	5	6	7			
				ln!	tial						
pН	7.44	7.45	7.59	7.48	7.49	7.40	7.49				
DO (mg/L)	7.9	7.8	7.8	7.8	8.3	7.9	7.8				
Cond. (µmhos-cm)	504	513	524	504	489	484	494				
Temp (°C)	24.0	24.9	25.8	24.9	24.2	24.3	24.8				
					)Bi						
pH		7.95	7.92	8.00	7.87	8.02	7:91	7.76			
DO (mg/L)		7.4	8.3	8.0	7.8	7.9	7.9	7.4			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration	2,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				le)	tje U						
pН	7.30	7.29	7.42	7.29	7.33	7.31	7.32				
DO (mg/L)	7.9	7.8	8.1	7.8	8.3	7.9	7.8				
Cond. (µmhos-cm)	793	815	845	809	788	785	807				
Temp (°C)	24.0	24.9	25,8	24.9	24.1	24.3	25.3				
				FI	(a)						
pН		7.86	7.84	7.90	7.68	7.91	7.76	7.67			
DO (mg/L)		7.5	8.3	7.9	: 7.0	7.9	7,7	7.1			
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8			

Concentration				4,000	mg/L			
Day	0	1	2	3	4_	_5	6	7
				. In	ual			
pH	7.12	7.10	7.23	7.10	7.14	7,12	7.14	
DO (mg/L)	7.8	7.9	8.1	7.8	8.4	7.8	_7.7	
Cond. (µmhos-cm)	1387	1393	1452	1415	1390	1322	1392	
Temp (°C)	24.0	24.6	25.5	24.9	24.0	24.1	25.9	
					ial			
Нq		7.67	7.69	7.95	7.64	7.75	7.74	7.58
DO (mg/L)		7.2	8.2	8.0	7.4	24.3	8.0	7.2
Temp (°C)		24.2	24.1	24.6	24.2	24.3	24.5	24.8

Concentration	8,000 mg/L										
Day	0	1 1	2	3	4	5	6	7			
				h	lial						
pН	6.94	6.92	7.02	6.91	6.98	NR	NR				
DO (mg/L)	7.9	7.9	8.2	7.9	8.4	NR	NR				
Cond. (µmhos-cm)	2500	2500	2580	2530	2380	NR	NR				
Temp (°C)	24.0	24.3	25.4	25.0	24.0	NR	NR				
				F	ial						
pH		7.44	7.49	7.42	NR .	NR	NR	NR			
DO (mg/L)		7.4	8.3	8.0	NR	NR	NR	NR			
Temp (°C)		24.2	24.1	24.6	NR	NR	NR	NR			

Concentration	10,000 mg/L										
Day	0	1	2	3	4	5	6	7			
				in	tiat						
рН	6.85	6.84	6.94	6.83	6.89	NR	NR.				
DO (mg/L)	7.8	8.0	8.2	8.0	8.5	NR	NR				
Cond. (µmhos-cm)	3060	3050	3160	3110	3000	NR	NR ³				
Temp (°C)	24.0	24.0	25.2	24.9	24.0	NR	NR				
				- FI	121						
pН		7.36	7.37	7.32	7.53	NR	NR	NR			
DO (mg/L)		7.7	8.4	8.0	8.5	NR	NR	NR			
Temp (°C)		24.2	24.1	24.6	24.2	NR	NR	NR			

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

Notes: NR = not recorded because all organisms in that concentration were dead

## Appendix Table C-3a. Water Quality Summary for 7-day *Ceriodaphnia dubia*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 10 December 2002

Conc.	Ban		Dal	ly Repr	oductio	n/ Sun	/ival		Total
(mg/L)	Rep		2	3	4		6	7	TOLBI
	1	0	0	0	6	14	23	а	43
	2	0	0	3	В	12	23	а	44
	3	0	0	0	0	11	19	а	30
<u>"</u>	4	0	0	5	0	12	22	а	39
ъс	5	0	0	0	9	16	20	а	45
Lab Control	6	0	0	4	0	13	21	а	38
₫	7	0	0	3	0	14	22	а	39
	8	0	0	0	0	.12	24	а	36
	9	0	0	0	7	12	8 .	а	25
	10	0	0	5	0	14	15	а	34

Conc.	Ban	Dally Reproduction/ Survival									
(mg/L)	Rep		g	3	, a	5	6	7	Total		
	1	0	0	0	0	0	0	а	0		
	2	0	0	0	0	0	0	а	0		
	3	0	0	0	0	0	0	а	0		
	4	0	0	0	0	0	0	а	0		
2,000	5	0	0	0	0	0	0	а	0		
Š	6	0	0	0	0	0	0	а	0.		
ĺ	7	0	0	0	0	0	0	а	0		
	8	0	0	O	0	0	0	а	0		
	9	0	0	0	0	0	0	а	0		
	10	0	0	0	0	0	0	а	0		

Сопс.	Rep		Dal	ly Repr	oductic	n/ Sun	/ival		Total
(mg/L)	Weh		2	3	4		6	7	ICUAL
	1	0	0	0	Q/d				0/d
	2	0	0	Q/d	1				0/d
	3	0	0	0/d		-	1	-	0/d
	4	0	0	0/d	-	-	-		0/d
8,000	5	0	0	0/ <b>d</b>	1	-			0/d
8	6	0	0	0/d		+	1	-	0/d
	7	0	0	0/d	1	1	-		0/d
	8	0	0	0/d	1	1	4-	-	0/d
	9	0	0	0/d	-	1		1	0/d
	10	0	0	0/d			••	1	0/d

Сопс.	Rep		Daily Reproduction/ Survival									
(mg/L)	wah		2	3		5	6	7	Total			
	1	0	0	0	8	14	14	а	34			
	2	0	0	6	0	14	20	а	40			
	3	0	0	6	7	17	15	а	45			
	4	0	0	6	9	0	14	а	29			
500	5	0	0	6	12	0	21	а	39			
ŏ	6	0	0	Ģ	0	4	15	а	19			
	7	0	0	7	7	13	8	а	35			
	8	0	0	. 6	12	0	24	а	42			
	9	0	0	2	7	13	18	а	40			
·	10	0	0	1	6	13	22	а	42			

Conc.	Rep		Dal	ly Repr	oductio	on/ Sur	/lvai		Total
(mg/L)	Keh		2	3	4	6	6	7	TOTAL
	1	٥	0	0	0	0	. 0	а	0
	2	٥	0	0	0	0	0	а	0
	3	0	0	0	0	0	. 0	а	0
	4	0	0	0	0	0	0	а	0
4,000	5	0	0	0	0	0	0	d	0/d
8	6	0	0	O	0	0	0	а	0
	7	0	0	0	0	0	0	а	0
	8.	0	0	0	0	0	0	а	Ö
	9	0	0	0	0	0	0	а	0
	10	0	0	0	0	0	0	а	0

Conc.	Rep		Dai	ly Repr	oductio	n/ Sur	vival		Total
(mg/L)	IXeb		2	3	4	5	6	7	ď
	1	0	0	0/d				1	0/d
	2	0	0	0/d	ı	1	_	1	o/d
	က	o	0/d	-	ı	ı	-		0/d
	4	0	0	0/d	1		1	1	0/d
10,000	5	0	0	0/d	1		-		0/d
8	9	0.	0	0/d	1	1	1	-	0/d
	7	0	0	0/d	ı	1	1		0/d
	8	0	O/d	1	ł		1	-	0/d
	9	0	0/d	1	1	1	1		0/d
	10	C	0/d	-			-		0/d

Conc.	Ban		Dal	y Repr	oductio	n/ Sur	/ival	·	Total
'(mg/L)	Rep			3			e		TOTAL
•	1	0	0	0	0	7	10_	а	17
	2	.0	0	0 _	0	9	1	a	10
	3	0	.0	2	0	7	14	a	23
	4	0	0	4	0	₿	83	а	18
1,000	5	0	0	0	5	4	14	а	23
8	6	0	0	3	8	0	10	а	21
	7	0	0	3	0	11	17	8	31
	8	0	0	3	7	0	13	8	23
	9	0	0	0	8	5	7	а	18
	10	0	0	0	5	4	8	а	17

AMEC Bloassay Laboratory - 6550 Morehouse Dr., Suite B. San Diego, CA 92121.

Notes: d = organism dea

a = organism slive, reproductive counts not taken because test acceptability criteria were met on day 6.

LIP = organism lost in process, excluded from statistical analysis

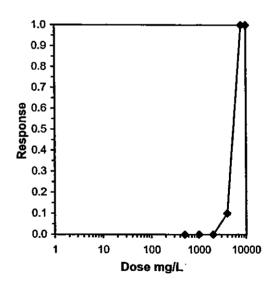
	BEAZER		Sample ID	Reprodu		212-208			12/10/2002	Start Date:
Product	Industrial F	pe:	Sample Ty	say SD S	MEC Bioas	AEESD-AN	_ab ID: /	! 1	12/17/2002	End Date:
laphnia dubia	CD-Ceriod	es:	Test Speci	water Ch	PA Fresh	EPAF 94-E	Protocol: E	I		Sample Date:
•									PSA	Comments:
 10	9	8	7	6	5	4	3	2	1	Conc-mg/L
 1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	L-Lab Control
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	500
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2000
1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	4000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10000

				Not			Fisher's	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	0	10	10	10			0	10
500	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
1000	1.0000	1.0000	. 0	10	10	10	1.0000	0.0500	0	10
2000	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
4000	0.9000	0.9000	1	9	10	10	0.5000	0.0500	1	10
*8000	0.0000	0.0000	10	0	10	10	0.0000	0.0500	10	10
*10000	0.0000	0.0000	10	0	10	10	0.0000	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	
Fisher's Exact Test	4000	8000	5656.85		

Trimmed Spearman-Karber

Trim Level	EC50	95%	CL	
0.0%	5278.03	4627.6	6019.89	
5.0%	5396.78	4579.7	6359.64	
10.0%	5443.16	5018.73	5903.48	
20.0%	5443.16	5018.73	5903.48	
Auto-0.0%	5278.03	4627.6	6019.89	



Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date: End Date: Sample Date:

Comments:

12/10/2002 12/17/2002

**PSA** 

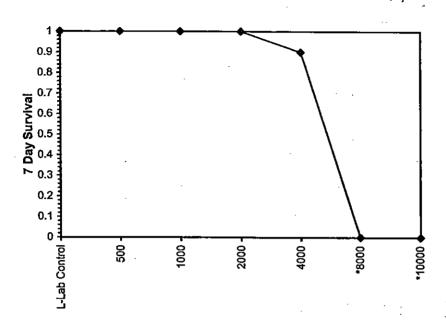
Test ID: 0212-208

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Protocol: EPAF 94-EPA Freshwater Cr Test Species:

BEAZER

Industrial Product CD-Ceriodaphnia dubia



Ctart Dates	12/10/2002	<u>, </u>		iphnia Sur	vival and							
Start Date:		-	Test ID:		4E0 D:		Sample ID		BEAZER			
End Date:	12/17/2002	2		AEESD-AN					Industrial			-
Sample Date: Comments:	PSA		Protocoi:	EPAF 94-E	:PA Fresi	iwater Cr	rest Spec	ies:	CD-Ceriod	laphnia di	ubia	
Conc-mg/L	1	2	3	4	5	6	7	8	9	10		
L-Lab Control	43.000	44.000	30.000	40.000	45.000	38.000	39.000	36.000	25.000	34.000		
500	34.000	40.000	45.000	29.000	39.000	19.000	35.000	42.000	40.000	42.000		
1000	17.000	10.000	23.000	18.000	23.000	21.000	31.000	23.000	18.000	17.000		
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
4000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
8000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
10000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
									0,000	0.000		
				T		· · · · ·			4 = 11 1			
0	11	M Mass	11	Transforn			<u> </u>	Rank	1-Tailed			
Conc-mg/L		N-Mean	Mean 27 400	Min	Max	CV%	N 10	Sum	Critical	_	Mean	N-Mean
L-Lab Control 500		1.0000 0.9759	37.400 36.500	25.000 19.000	45.000 45.000	17.014	10	400 E0	74.00		37.400	0.0000
*1000		0.5374	20.100	10.000	31.000	21.113 27.496	10 10	103.50			36.500	0.024
*2000		0.0000	0.000	0.000	0.000	0.000	10	57.00 55.00			20.100	0.4626
*4000		0.0000		0.000	0.000	0.000	10	55.00 55.00			0.000	1.0000
*8000		0.0000	0.000	0.000	0.000	0.000	10	55.00 55.00			0.000	1.0000
*10000		0.0000	0.000	0.000	0.000	0.000	10	55.00 55.00				1.000
10000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	74.00		0.000	1.0000
Auxiliary Tes							Statistic		Critical		Skew	Kurt
Kolmogorov D				tribution (p	<= 0.01)		2.65829		1.035		-1.2591	5.73658
Equality of var												
Hypothesis T			NOEC	LOEC	ChV	ΤU						
Steel's Many-	One Rank	Test	500	1000	707.107			•	_			
				ŀ	Maximum	Likeliho	od-Probit	<del></del>				
Parameter	Value	SE		cial Limits	5	Control	Chi-Sq		P-value	Mu	Sigma	lter
Slope	7.88207			16.6937		0	0.18619	9.48773	1	3.01139	0.12687	5
Intercept	-18.736	13.492	-45.18	7.70832								
TSCR							1.0			<del></del>	<b>→ •</b>	
Point	Probits	mg/L		icial Limit	5		0.9 -			- 1		
EC04	2 674	520 20					U.U	I				

			Maxim	um Likeliho	od-Probit					
Parameter_	_Value	SE	95% Fiducial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	7.88207	4.49574	-0.9296 16.6937	0	0.18619	9.48773	1	3.01139	0.12687	5
Intercept	-18.736	13.492	-45.18 7.70832							
TSCR					1.0 ¬					
Point	Probits	mg/L	95% Fiducial Limits		-			- 1	` ]	
EC01	2.674	520.29	-		0.9			- 1		
EC05	3.355	634.902			0.8 -			1		
EC10	3.718	705.991			0.7			1		
EC15	3.964	758.398	•		0.7			- 1	i	
EC20	4.158	802.811			<b>%</b> 0.6 -			1		
EC25	4.326	842.98			9.0.0.5 0.0.0.4 0.4					
EC40	4.747	953.339			d S			•		
EC50	5.000	1026.57			<b>₽</b> 0.4 -			- 1	Į.	
EC60	5.253	1105.43			0.3 -			- 1	1	
EC75	5.674	1250.15			-			- 1		
EC80	5.842	1312.7			0.2 -			- 1		
EC85	6.036				0.1 -			1		
EC90	6.282	1492.73			0.0 -			4	- 1	
EC95	6.645	1659.86			0.0 -	1 111111111111111111111111111111111111	400	4000	40000	
EC99	7.326					1 10	100 <b>Dose n</b>		10000	

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: End Date:

12/10/2002 12/17/2002 Test ID: 0212-208

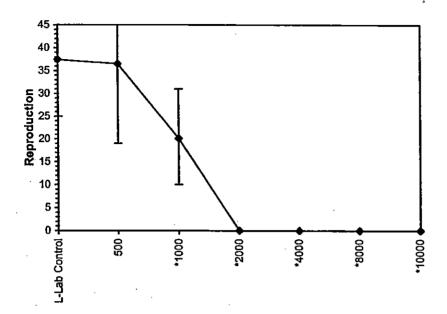
Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: BEAZER

Sample Date: Comments:

**PSA** 

Protocol: EPAF 94-EPA Freshwater Ch Test Species:

Industrial Product CD-Ceriodaphnia dubia



Pimephales promelas

### Appendix Table C-4a.

## Water Quality Summary for 96-hour *Pimephales promelas*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 10 December 2002

Concentration	Don			ımbe					ived C (mg/L)	xygen			(r	pH oH unit	s)		ľ	nducti nhos-c	-		Te	mperat (°C)	ture		Percent Survival
(mg/L)	Rep			Orgai 48		96	Ø	24	48		96	0	24		72	96	o)	48		Q	24		72		
	Α	10	10	9	9	9	7.9	8.0	7.7	6.6	8.1	8.09	7.20	7.21	7.21	7.45	192	196	207	20.2	20.3	20.0	20,5	19.8	90
	В	10	10	10	10	10	4		1														ş ().		100
Lab Control	С	10	10	10	10	10		/210 / F																	100
	D	10	10	10	10	10	ale tomos									27				11000					100
-	Α	10	10	10	10	10	7.9	7.7	7.6	6.6	8,2	8.21	7.61	7.40	7.41	7.64	494	452	475	20.2	20.2	20.0	20.2	19.8	100
<b>500</b>	В	10	10	10	10	10														د د و سود با					
500	С	10	10	10	10	10														<u></u>			12.		100
	D	10	10	10	10	10										وتكادمون				السنتان والأرا	erasin Side	77 - 75 - 75 7 - 7 - 7 - 7			100
	Α	10	10	10	10	10	7.9	7.6	7.8	6.6	8.1	8.25	7.71	7.55	7.65	7.69	731	731	762	20.2	20.2	20.1	20.2	19.8	100
1 000	В	10	10	9	9	8													L		عب نون عام		200		80
1,000	ပ	10	10	10	10	10												L				1601	25.		100
	۵	10	10	10	10	10																			100
	Α	10	10	10	10	10	7.9	7.7	7.8	6.6	8.0	8.26	7.77	7.65	7.75	7.78	1375	1269	1304	20.2	20.1	20.2	20.1	19.8	100
2,000	В	10	10	10	10	10													أ						100
2,000	O	10	10	9	9	9								4				Ÿ. Y			1. 262 GW	N.			90
	D	10	10	10	10	10		المساء						فنينيد		Elemania Linearen		مأدما الحويرة	ilon district	A P					100
	Α	10	10	10	10	10	7.9	7.7	7.4	6.8	8.0	8.26	7.78	7.70	7.81	7.79	2490	2280	2350	20.2	20.1	20.2	20.0	19.8	100
4,000	В	10	10	10	10	10									Linto Classi		-		ار داند دا			2.42.25			100
4,000	C	10	10	10	10	10					- 27 3 2 4	د امریست													100
·	D	10	10	10	10	10															000	2004	400	19.8	100 100
	Α	10	10	10	10	10	7.9	7.9	7.3	6.6	8.0	8.25	7.83	7.69	7.87	7.82	4720	4310	4440	20.2	20.0	20.1	19.9	19.6	100
8,000	В	10	10	10	10	10						È												经企业 图特·克	90
-1	O	10	9	9	9	9									الدائد الدائد									- S2	100
	D	10	10	10	10	10									7.00	7.04	5100	E200	5700	20.2	20.0	20.0	19.9	19.8	100
	Α	10	10	10	10	10	7.9	8.1	7.9	6.6	8.0	8.24	7.82	7.71	7.85	.7.81	9,100	5300	3700	20.2	20.0	20.0	19.9	13.3	100
10,000	В	10	10	10	10	10											2								100
·	С	10	10	10	10	10	: 7 : : : : : :		77.	2								Para							100
	D	10	10	10	10	10	ogo CA			لا فالمديا				لتديكين		السناية أراء		المنتصاب	الد تستنا	د ســــــــــــــــــــــــــــــــــــ	بالمستدا	لتخدما	والمتعادث	والنف واستفا	

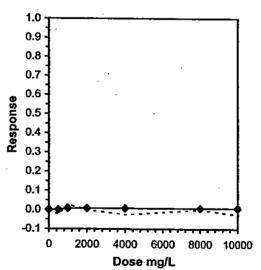
AMEC Bioassay Laboratory - 5550 Morehouse Dr., Sulle B San Diego, CA 92121.

				Αςι	ite Fish Test-96	Hr Survival		
Start Date: End Date: Sample Date: Comments:	12/10/2002 12/14/2002 BMDSA		Lab ID:	0212-132 AEESD-AM EPAA 93-EI	EC Bioassay SD PA Acute	Sample ID: Sample Type: Test Species:	BEAZER Industrial Product PP-Pimephales pr	
Conc-mg/L	1	2	3	4			· · · · · · · · · · · · · · · · · · ·	
L-Lab Control	0.9000	1.0000	1.0000	1.0000				
500	1.0000	1.0000	1.0000	1.0000				
1000	1.0000	0.8000	1.0000	1.0000				
2000	1.0000	1.0000	0.9000	1.0000				
4000	1.0000	1.0000	1.0000	1.0000				
8000	1.0000	1.0000	0.9000	1.0000	-			
10000	1.0000	1.0000	1.0000	1.0000				

				ansform:	Arcsin Sc	uare Root	}	Rank	1-Tailed	İsot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	_ Sum	Critical	Mean	N-Mean
L-Lab Control	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4			0.9875	1.0000
500	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9875	1.0000
1000	0.9500	0.9744	1.3358	1.1071	1.4120	11,411	4	17.50	10.00	0.9800	0.9924
2000	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4	18.00	10.00	0.9800	0.9924
4000	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9800	
.8000	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4	18.00	10.00		0.9924
10000	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9800 0.9800	0.9924 0.9924

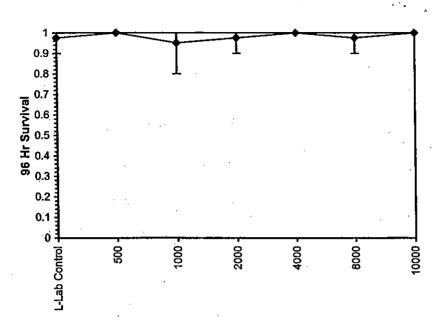
Auxiliary Tests				_	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal di	stribution (p	<= 0.01)		0.75123	0.896	-1.8614	3.7366
Equality of variance cannot be co	nfirmed		_				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.7000
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤŪ	, <u> </u>			<del></del> .
Steel's Many-One Rank Test	10000	>10000			<u>·</u>			

			Line	ear Interpolati	on (200 Resamples)	
<u>P</u> oint	mg/L	SD	95% CL(Exp)	Skew	,	
IC05	>10000	·			<del></del>	<del> </del>
IC10	>10000			•	•	
IC15	>10000				46	
IC20	>10000	:			1.0	
IC25	>10000				0.9 -	
IC40	>10000				0.8 -	
IC50	>10000		e e		0.7	
				<del></del>	0.6	



Acute Fish Test-96 Hr Survival Start Date: 12/10/2002 Test ID: 0212-132 Sample ID: BEAZER Lab ID: AEESD-AMEC Bioassay SD Sample Type: End Date: 12/14/2002 Industrial Product Protocol: EPAA 93-EPA Acute PP-Pimephales promelas Sample Date: **Test Species:** Comments: **BMDSA** 





# Appendix Table C-4b. Water Quality Summary for 96-hour *Pimephales promelas*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 10 December 2002

Concentration	Rep	Number of ep Live Organisms					Disso	lved C				pH (pH units)			Conductivity (µmhos-cm)			Temperature (°C)				Percent			
(mg/L)	Leb	0	Live 24		nism: 72	96 96	0	24	(mg/L)		96	0	24		s) 72	96	0	48		O	24		72	96	Survival
<u> </u>	Α	10	10	10	10	10	7.9	7.8	7.9	6.5	8.1	8.09	7.26	7.44	7.50	7.42	192	221	230	20.2	20.2	20.1	20.3	19.8	100
	В	10	10	10	10	10						X.													100
Lab Control	c	10	10	10	10	10								×= -											100
	D	10	10	10	10	9		F-17 7F-17														18.3			90
	Α	10	10	10	10	10	7.9	7.8	7.3	6.6	8.1	8.12	7.38	7.57	7.62	7.62	395	383	399	20.2	20.2	20,1	20.2	19.8	100
	В	10	10	10	10	10		107716N T											76.2						100
500	С	10	10	10	10	10				PEAC TO A												177			100
	D	10	10	10	10	10																			100
	Α	10	10	10	10	10	7.9	7.4	7.4	6.5	8.0	8.18	7.56	7.68	7.71	7.69	601	562	587	20.2	20.2	20.0	20.1	19.8	100
4 000	В	10	10	10	10	10	A. 18			7.E.)**		AV.				9 (X.)									100
1,000	С	10	10	10	10	10																			100
	D	10	10	10	10	10																			100
·	Α	10	10	10	10	9	7.9	7.7	7.9	6.5	8.0	8.23	7.69	7.57	7.75	7.75	971	886	920	20.2	20.0	20.0	20.0	19.8	90
2 200	В	10	10	10	10	10																			100
2,000	C	10	10	10	10	10																			100
	D	10	10	10	10	10												فـر ــا ايد							100
	Α	10	10	10	10	10	7.9	7.8	7.7	6.5	8.1	8.25	7.75	7.65	7.80	7.80	1790	1616	1660	20.2	20.1	20.0	20.0	19.8	100
4000	В	10	10	10	10	10	4.74											ا ماد داد			, 23 - 22				100
4,000	С	10	10	10	10	10	. 77 - 73	-7-7-7-7																	100
	D	10	10	10	10	10				7/4					(		il.								100
	Α	10	10	10	10	10	7.9	8.1	7.8	6.6	8.0	8.23	7.80	7.60	7.85	7.82	3280	2990	3140	20.2	20.0	20.1	20.0	19.8	100
	В	10	10	10	10	10												7.7	18.7	7.77777		e e e e e e e e e e e e e e e e e e e		21.3.32 20.3.32	100
8,000	С	10	9	9	9	9																			90
	D.	10	10	10	10	10																			100
	Α	10	9	9	9	9	7.9	8.0	8.1	6.7	8.0	8.22	7.80	7,73	7.85	7.82	4020	3700	3990	20.2	19.8	20.0	20,0	19.8	90
10,000	В	10	10	10	10	10														u.i.s.l					100
10,000	С	10	10	10	10	10					1						e e e e e e e e e e e e e e e e e e e								100
	D	10	10	10	10	10									المناسفة.		والمناء المستدارة								100

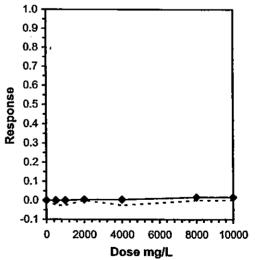
AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

Acute Fish Test-96 Hr Survival										
Start Date:	12/10/2002		Test ID:	0212-133		Sample ID:	BEAZER			
End Date:	12/14/2002		Lab ID:	AEESD-AME	C Bioassay SD	Sample Type:	Industrial Product			
Sample Date:			Protocol:	EPAA 93-EF	A Acute	Test Species:	PP-Pimephales promelas			
Comments:	BM\$A					•				
Conc-mg/L	1	2	. 3	4			<del></del>			
L-Lab Control	1.0000	1.0000	1.0000	0.9000		,				
500	1.0000	1.0000	1.0000	1.0000						
1000	1.0000	1.0000	1.0000	1.0000						
2000	0.9000	1.0000	1.0000	1.0000						
4000	1.0000	1.0000	1.0000	1.0000						
8000	1.0000	1.0000	0.9000	1.0000						
10000	0.9000	1.0000	1.0000	1.0000						

			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean	
L-Lab Control	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4			0.9917	1.0000	
500	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9917	1.0000	
1000	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9917	1.0000	
2000	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4	18.00	10.00	0.9875	0.9958	
4000	1.0000	1.0256	1.4120	1.4120	1.4120	0.000	4	20.00	10.00	0.9875	0.9958	
8000	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4	18.00	10.00	0.9750	0.9832	
10000	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4	18.00	10.00	0.9750	0.9832	

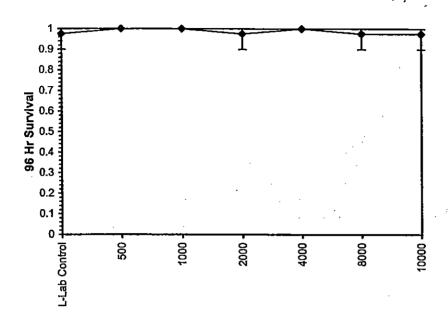
	Auxiliary Tests			_		Statistic	Critical	Skew	Kurt	
	Shapiro-Wilk's Test indicates non	ı-normal di	stribution (		0.66932	0.896	-1.6154	1.55423		
	Equality of variance cannot be co	nfirmed								
_	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU			· <del>-</del>		
	Steel's Many-One Rank Test	10000	>10000			•				

	•		Linear Interpolation (200 Resamples)									
Point	mg/L	SD	95% CL(Exp)	Skew								
IC05	>10000			· · · · · · · · · · · · · · · · · · ·								
IC10	>10000											
IC15	>10000		-	1.0								
IC20	>10000			0.9								
IC25	>10000			· •								
IC40	>10000			0.8 🔒								
IC50	>10000			0.7 -								



Start Date: 12/10/2002 Test ID: 0212-133 Sample ID: BEAZER
End Date: 12/14/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product
Sample Date: Protocol: EPAA 93-EPA Acute Test Species: PP-Pimephales promelas

#### Dose-Response Plot



Comments:

**BMSA** 

#### Appendix Table C-4c. Water Quality Summary for 96-hour *Pimephales promelas*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 10 December 2002

Concentration	Rep			ımbe Orgai				Disso	lved O (mg/L)				(ı	pH oH unit	ts)			nducti nhos-c	•		Te	mperat (°C)	ture		Percent
(mg/L)	Lyeb	0		48			0	24	48	72	96	0	24	48	72	96	D		96	0	24		72	96	Surviva
<del></del>	A	10	10	10	10	10	7.9	7,8	8.0	6.4	8.1	8.09	7.61	7.87	8.37	7.98	192	188	207	20.2	20.2	20.2	20.3	19.8	100
	В	10	10	10	10	10											27/								100
Lab Control	С	10	9	8	8	8																			80
	В	10	10	10	10	10		N.									1.				c y				100
	Α	10	10	10	10	10	7.9	7.9	7.7	7.0	8.1	7.57	7.76	7.75	8.17	7.92	346	326	345	20.2	20.2	20.0	20.2	19.8	100
<b>700</b>	В	10	9	9	9	9																			90
500	С	10	10	10	10	10									55			7030 (5)0 1000 (5)0							100
	D	10	10	10	10	10																			100
	Α	10	10	10	10	10	7.9	7.8	7.7	6.8	8.0	7.44	7.70	7.88	8.11	7.81	504	468	491	20.1	20.1	20.0	20,2	19.8	100
4.000	В	10	10	10	10	10																			100
1,000	Ç	10	10	10	10	10													ا السائدة المائدة						100
	۵	10	10	10	10	10																			100
	Α	10	10	10	10	10	7.9	8.1	7.5	6.8	7.8	7.30	7.64	7.65	8.01	7.73	793	732	759	20.0	20.0	20.0	20.2	19.8	100
2,000	В	10	10	10	10	10																			100
2,000	O	10	10	10	10	10																			100
	D	10	10	9	9	9					10 (40 77 20 S							11.							90
	Α	10	10	10	10	10	7.8	7.9	7.3	6.6	8,0	7.10	7.49	7.54	7.86	7.61	1415	1261	1312	19.9	19.9	20.0	20.1	19.8	100
4,000	В	10	10	9	9	9																			90
4,000	С	10	10	10	10	10															و دار در در در در				100
	D	10	10	10	10	10							أدحت												100
	Α	10	10	9	9	9	7.9	7.9	7.7	6.5	7.8	6.94	7.30	7.37	7.64	7.40	2500	2250	2350	19.9	19.9	20.0	20.0	19.8	90
8,000	В	10	10	10	10	10						1 (12) (1 1 (12) (1)													100
0,000	C	10	10	9	9	8																			80
	Ð	10	10	10	10	10	0 3, 4 	ا ف لد داما														2			100
	Α	10	10	9	9	9	7.8	8.0	8.0	6.7	8.0	6.85	7.24	7.33	7.52	7.31	3060	2790	2980	20.0	19.8	20.0	19.8	19.8	90
10,000	В	10	10	10	10	10												!	z wiet it 2 – £ekt.d						100
10,000	С	10	10	9	9	8																			80
[	D	10	10	10	10	10			1								ا ما د ماند.	i	الديد			ا الدورية		-24	100

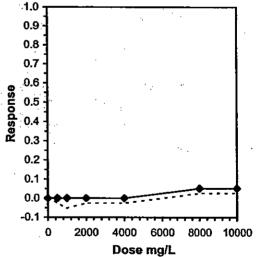
AMEC Bloassay Laboratory - 5550 Morehouse Dr., Sulte B San Diego, CA 92121.

				A	cute Fish Test-96	Hr Survival		
Start Date: End Date: Sample Date: Comments:	12/10/2002 12/14/2002 PSA		Lab ID:		MEC Bioassay SD EPA Acute	Sample ID: Sample Type: Test Species:	In	EAZER idustrial Product P-Pimephales promelas
Conc-mg/L	1	2	3	4			<del></del>	<u>.</u>
L-Lab Control	1.0000	1.0000	0.8000	1.0000	<del></del>	,		<del></del>
500	1.0000	0.9000	1.0000	1.0000	,		•	
1000	1.0000	1.0000	1.0000	1.0000	•			
2000	1.0000	1.0000	1.0000	0.9000				
4000	1.0000	0.9000	1.0000	1.0000				
8000	0.9000	1.0000	0.8000	1.0000	•			
10000	0.9000	1.0000	0.8000	1.0000				

		_	Tra	ansform: /	Arcsin Sc	uare Root	t	Rank	1-Tailed	Isoto	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
L-Lab Control	0.9500	1.0000	1.3358	1.1071	1.4120	11.411	4			0.9750	1,0000
500	0.9750	1.0263	1.3713	1.2490	1.4120	5.942	4	18.50	10.00	0.9750	1.0000
1000	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	4 -	20.00	10.00	0.9750	1.0000
2000	0.9750	1.0263	1.3713	1.2490	1.4120	5.942	4	18.50	10.00	0.9750	1.0000
4000	0.9750	1.0263	1.3713	1.2490	1.4120	5.942	4 .	18.50	10.00	0.9750	1.0000
8000	0.9250	0.9737	1.2951	1.1071	1.4120	11.347	4	16,50	10.00	0.9250	0.9487
10000	0.9250	0.9737	1.2951	1.1071	1.4120	11.347	4	16.50	10.00	0.9250	0.9487

Auxiliary Tests	50 - 7				Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	-normal dis	tribution (	p <= 0.01)		0.87287	0.896	-0.9576	0.04343
Equality of variance cannot be co	nfirmed					#		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	10000	>10000	17		·····,			

		Linear Int	erpolation (200 Resamples)	
Point	mg/L SD	95% CL(Exp) Ske	ew .	š. ,
IC05	7900	1		
IC10	>10000		10° - 4° 3	
IC15	>10000	* * .	1.0	
IC20	>10000	1	4	
1C25	>10000		0.9 1	
IC40	>10000		0.8	
IC50	>10000	· · · · · · · · · · · · · · · · · · ·	0.7 -	
	15		•	



Acute Fish Test-96 Hr Survival **BEAZER** Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product

12/10/2002 Start Date:

12/14/2002 End Date:

Test ID: 0212-131

Protocol: EPAA 93-EPA Acute

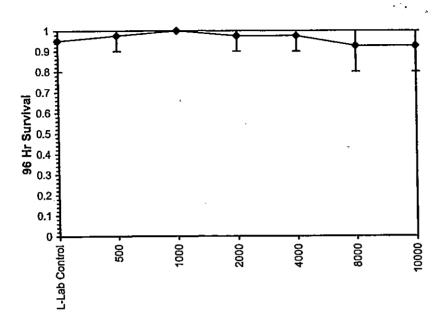
Test Species:

PP-Pimephales promelas

Sample Date: Comments:

**PSA** 

Dose-Response Plot



Hyalella azteca

## Appendix Table C-5a. Water Quality Summary for 96-hour *Hyalella azteca*Exposure to Benzene Metadisulfonic Acid (BMDSA)

#### Initiated: 12 December 2002

Concentration	Rep		Live nisms			lved O (mg/L)	xygen	··· <del>·</del>		(1	pH pH unit	(s)	· · · ·			onduct µmhos	-			Te	empera (°C)			Percent Survival
(mg/L)		O	96	Ö	24	48	72	96	O	24	48	72	96	Q	24	48	72	96	0	24	48	72	96	1 1
	Α	10	10	8.8	6.0	5.8	6.5	6.6	7.74	7.58	7.53	7.79	7.65	823	811	810	809	811	20.2	20.3	20.1	20.0	20.0	100
	В	10	10						11/4/2										200					100
Lab Control	C	10	10												22.2									100
•	D	10	10																					100
	E	10	9											2.5			1.5		الداكات					90
	Ā	10	10	8.0	4.5	5.2	5.9	6.0	7.82	7.60	7.54	7.78	7.73	1095	1095	1095	1096	1100	20.4	20.7	20.1	20.0	D HAVESTON AND	100
1	В	10	10															أرا ماد الماد الماد الماد			10			100
500	Ç	10	8												c.e.tit						4.0			80
	۵	10	10		Carles anno 111	ان پردید					والمستنية	ш												
	E	10	10					المستعدية	12.2					30.00					2.1.22					100
	A	10	10	8.3	4.9	6.0	6.3	6.6	7.87	7.64	7.61	7.82	7.82	1352	1348	1346	1349	1354	20.3	20.3	20.0	20.0	20.0	100
	В	10	10							1. 1. 10 10 10 11 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1											1			100
1,000	С	10	10																					100
	D	10	10	_																				100
	E	10	10_															4070			200	00.0		100
	Α	10	10	8.5	4.5	5.5	6.0	6.4	7.94	7.67	7.60	7.83	7.81	1872	1875	1871	1873	1879	20.0	20.3	20.0	ALIGNAS SANCE	20.0	100
i	В	10	10																				2.2	100 100
2,000	Ç	10	10						ļ.,	i Les van desire													10.00	
	D	10	10								فنتن بسيدي	المالية المالية								<u>.</u>	F			100 100
	E	10	10									les Later				2050	2050	2050	00.4		00.0	20.0		100
	Α	10_	10	8.5	5.1	6.5	6,1	6.7	7.98	7.68	7.65	7.87	7.85	2860	2860	2850	2850	2850	20.1	20.3	20.0	20.0	20.0	100
	В	10	10						ļ S	إيسا					-		أسيدنين						2 1 1	100
4,000	_C	_10	- 10	La Constant												أروا فالشجية	<u> </u>			1 200				100
	D	10	10	د د ات و دار د د د						1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	<u></u>											3		100
	E	10	10				<u>ا محمدا</u>	لمقديت		متعلقه		المستنانا					4700	4770	100	00.0				100
	A	10	10	8.6	4.1	3.8	5.0	6.0	7.99	7.71	7.56	7.85	7.82	4800	4/90	4770	4/60]	4//0	19.9	20.3	20.0	20.0	20.0	100
	_В_	10	10_															34 37 37				Section 1		100
8,000	C	10	10		فألف المالية							;												100
	D_	10	10									1								<u> </u>			<b>阿里姆岛斯</b> 斯里姆斯拉	90
	Е	10	9							7.00		7.76	7.04	5700	5000	5670	5670	5600	20.2	20.3	20.0	19.9	20,0	100
	Α.	10	10	8.6	6.0	6.0	4.5	6.5	7.97	7.69	7.59	7.70	7.81	5730	5680	5670	5670	5690	20.2	∠∪.3 %2.003	20.0	19,9	20,0	100
	В	10	10						7.3		<u>.</u>											residence Total		90
10,000	С	10	9														والم والساد							70
	D	10	7				-5					<u> </u>		-	<del></del> .									100
	E	10	10		أممدين			لكنيا	نبلينا	ويستسي		لحييت	أسيد	أشييب	أجيدكند		ال مستخب		بالمكتب والمتارك	a siai ki	and a second	فتد سفضائن لا		100

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

			A	mphipod 9	6-Hr Survival Bio	assay-96 Hr Sur	vival
Start Date: End Date: Sample Date: Comments:	12/12/2002 12/16/2002 BMDSA		Test ID: Lab ID:	0212-135	MEC Bioassay SD	Sample ID:	BEAZER Industrial Product HA-Hyalella azteca
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	0.9000	· · · · · · · · · · · · · · · · · · ·	
500	1.0000	1.0000	0.8000	1.0000	1.0000		
1000	1.0000	1.0000	1.0000	1.0000	1.0000		
2000	1.0000	1.0000	1.0000	1.0000	1.0000		
4000	1.0000	1.0000	1.0000	1.0000	1.0000		
8000	1.0000	1.0000	1.0000	1.0000	0.9000		
10000	1.0000	1.0000	0.9000	0.7000	1.0000		

			Tra	ansform:	Arcsin Sc	uare Root	t T	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	_ Sum	Critical	Resp	Number
L-Lab Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	·		1	50
.500	0.9600	0.9796	1.3510	1.1071	1.4120	10.092	5	27.00	16.00	2	- 50
1000	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	30.00	16.00	0	50
2000	1.0000	1.0204	1,4120	1.4120	1.4120	0.000	5	30.00	16.00	Ō	50
4000	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	30.00	16.00	Ŏ	50
8000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
10000	0.9200	0.9388	1.2953	0.9912	1.4120	14.210	5	24.50	16.00	4	50

Auxillary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	normal di	stribution (	o <= 0.01)		0.75361	0.91	-2.0098	5.18425
Equality of variance cannot be con	nfirmed							· · · · · · ·
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU			··	
Steel's Many-One Rank Test	10000	>10000						<del></del>

_	:			Maxi	mum Likeliho	od-Probit					. ' -
<u>Parameter</u>	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter.
Slope	9.49322	10.1447	-10.39	29.3769	0.02	5.12816	9.48773	0.27	4.15638	0.10534	6
Intercept	-34.457	40.4863	-113.81	44.8957							
TSCR	0.012	0.00689	-0.0015	0.0255		1.0 -					
Point	Probits	mg/L	95% Fidu	cial Limits		-				/	
EC01	2.674	8153.24				0.9				1	
EC05	3.355	9618.73	i -	•		0.8 -					
EC10	3.718	10504.8	<b>;</b>			0.7					
EC15	.3.964	11148.3		٠.		-		`	- 1		
EC20	4.158	11687.7	,			<b>일</b> 0.6 -					
EC25	4.326	12171.2				9.0.6 0.5 0.4		•			
EC40	4.747	13480.2				9 0.4 -			- [	i	
EC50	5.000	14334.5	;	•		_ ,			- 1		
EC60	5.253	15243	ļ			0.3 -			ı		
EC75	5.674	16882.4	١.,			0.2 -			- 1		
EC80	5.842	17580.8	} ·			0.1 -			· 1		
EC85	6.036	18431.5	j	-		-			•	- 1	
EC90	6.282	19560.5	,			0.0 -		TITEL TO	<del></del>	T 1 T T T T T T T T T T T T T T T T T T	
EC95	6.645					•	1 10	100 1	1000 1000	0 10000	
FC99		25202 1								0	

Dose mg/L

Amphipod 96-Hr Survival Bioassay-96 Hr Survival Test ID: 0212-135 BEAZER

Start Date: 12/12/2002 End Date: 12/16/2002

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Industrial Product

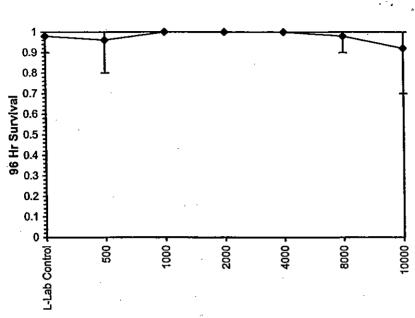
Sample Date: Comments:

**BMDSA** 

Protocol: ASTM 1999

**Test Species:** HA-Hyalella azteca





#### Appendix Table C-5b. Water Quality Summary for 96-hour *Hyalella azteca*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 12 December 2002

Concentration	Rep		Live nisms		Disso	olved C (mg/L)				(1	pH pH unit	's)				onduct umhos					emp (°	erati C)	ure		Percent Surviva
(mg/L)	Weh	0	96	0	24	48		96	0	24	48	72	96	O.	24	48	72	96	Ö	24		18	72	96	
<del></del>	Α	10	10	8.8	6.0	5.8	6.5	6.6	7.74	7.58	7.53	7.79	7.65	823	811	810	809	811	20.	2 20.	3 2	0.1	20.0	20.0	100
	B	10	10							11.00															100
Lab Control	Ĉ	10	10	3.0		[7		1000																	100
	D	10	10			2 - 1 : E	Y.	-107															100	1	100
	E	10	9	,																				<b>新春</b> 春	90
	Α	10	10	8.0	5.2	6.6	6.2	6.7	7.74	7.52	7.42	7.51	7.66	1011	1170	996	999	1001	20.	6   20.	2 2	).1	20.0	20.0	100
	В	10	10			N. 1885, 41		(1) (1) (1)					200						130						100
500	С	10	10						1.34		2000										2 3	<b>38</b>	2111		100
	D	10	10																S						100
	Ε	10	10																				N. S. V.		100
	A	10	10	8.1	5.0	6.2	6.4	6.7	7.79	7.57	7.54	7.64	7.79	1182	1508	1171	1175	1179	20.	6 20.	1 2	0.0	19.9	19.9	100
	В	10	10							ल ( हैंसे ' m ' ' हैं															100
1,000	С	10	10			<u>}</u>			, // t																100
	D	10	10								,														100
	E	10	10							مواند باز ورستان مواند باز ورستان											C C				100
	Α	10	10	8.0	4.0	6.4	6.1	6.9	7.83	7.53	7.58	7.69	7.80	1529	1780	1513	1517	1520	20.	5 20.	) 19	9.9	19.9	19.8	100
	В	10	10							ار در در در در در در در در در در در در در								ا (۱۹۰۷) محمد الرابط		1,					100
2,000	С	10	10														12.						2.2		100
	ם	10	10								g Alex											3.6			100
	E	10	10																						100
	Α	10	9	8.2	4.1	4.0	4.2	5.0	7.87	7.67	7.48	7,66	7.73	2230	2200	2210	2210	2220	20.	5 20.0	) 19	),8	19.9	19.9	90
	В	10	10																	10.11			· · · vic		100
4,000	С	10	9		7 (18) 2 (18)											د تنسب د تنسب									90
·	D	10	10													2.00									100
	Ē	10	10		و عدد د									135	40.0								<b>夏里</b> 成	翻線	100
	Ā	10	10	8.2	5.0	6.3	6.1	6.5	7.89	7,59	7.60	7.58	7.12	3540	3510	3510	3500	3510	20.	3 20.	1 19	.9	20.0	20.1	100
	В	10	10													,									100
8,000	С	10	10													21			1			اأركان	2.2.4		100
Į	D	10	9				<u> </u>																		90
	E	10	10								تنفيت				اد ک مشعب بدائد، اما				Ek in v	واستقلف					100
	Α	10	9	8.7	5.7	6.8	5.9	6.6	7.42	7.59	7.62	7.68	7.43	4240	4190	4200	4200	4210	20.3	3 20.1	20	0.0	20.0	20.1	90
	В	10	8																						80
10,000	C	10	7								اِــــــــــــــــــــــــــــــــــــ	إحداريا	أحجوجين	إ						Laiseal Lig					70
	D	10	7								,			أينز					9.42	لتا تحدد ده					70
	E	10	10					المراسلة المراسلة									استست					, 3	1000		100

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

			A	mphipod 9	6-Hr Survival Bio	assay-96 Hr Surv	ival
Start Date: End Date: Sample Date: Comments:	12/12/2002 12/16/2002 BMSA	-	Test ID: Lab ID:	0212-136	MEC Bioassay SD	Sample ID:	BEAZER Industrial Product HA-Hyalella azteca
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	0.9000		
500	1.0000	1.0000	1.0000	1.0000	1.0000	4	
1000	1.0000	1.0000	1.0000	1.0000	1.0000		
2000	1.0000	1.0000	1.0000	1.0000	1.0000		
4000	0.9000	1.0000	0.9000	1.0000	1.0000		
8000	1.0000	1.0000	1.0000	0.9000	1.0000		
10000	0.9000	0.8000	0.7000	0.7000	1.0000		

		_	Tra	ansform:	Arcsin Sc	uare Root	t .	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			1.00p	50
500	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	30.00	16.00	O	50 50
1000	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	30.00	16.00	0	50 50
2000	1.0000	1.0204	1.4120	1.4120	1.4120	0.000	5	30.00	16.00	0	50 50
4000	0.9600	0.9796	1.3468	1.2490	1.4120	6.628	5	25.00	16.00	2	50 50
8000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50 50
10000	0.8200	0.8367	1.1501	0.9912	1.4120	15.721	5	18.50	16.00	9	50 50

Auxiliary Tests	· · · ·				Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor Equality of variance cannot be co		stribution (	o <= 0.01)		0.84723	0.91	0.37479	3.37362
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TŪ	<u> </u>	<del></del> .	<del>_</del>	
Steel's Many-One Rank Test	10000	>10000		•		<del></del>		

			Maxin	num Likeliho	od-Probit					·
Parameter	Value	SE	95% Fiducial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	2.70129	1.56977	-0.3755 5.77804	0.02	5.92899	9.48773	0.2	4.42537	0.37019	6
Intercept	-6.9542	6.16614	-19.04 5.13145						0.0.0.0	Ū
TSCR	0.00608	0.0059	-0.0055 0.01764		1.0 -					
Point	Probits	mg/L	95% Fiducial Limits		-			/	/ 🗍	
EC01	2.674	3665.8			0.9			/	ľ	
EC05	3.355	6553.21			0.8 -			- 1		
EC10	3.718	8931.95			0.7			- 1		
EC15	3.964	11007.5						- 1		
EC20	4.158	12995.9			Response 0.5			- 1		
EC25	4.326	14985.7			<b>ऌ</b> 0.5 <b>-</b>					
EC40	4.747	21457.6			<u>~</u> ~ 1			- 1		
EC50	5.000	26629.9						- 1		
EC60	5.253	33048.9			0.3			- 1		•
EC75	5.674	47321.8			0.2 -					
EC80	5.842	54567.3			0.1			7.		
EC85	6.036	64424.4			4			$\mathcal{J}^{-}$		
EC90	6.282	79394.8			0.0		<del>'''                                  </del>	<del>7.4</del>		
EC95	6.645	108214			1		100	10000	1000000	
EC99	7.326	193450								

Dose mg/L

Amphipod 96-Hr Survival Bloassay-96 Hr Survival

Start Date: End Date: 12/16/2002

12/12/2002 Test ID: 0212-136 Lab ID: AEESD-AMEC Bioassay SD Sample Type:

Sample ID:

**BEAZER** 

Sample Date: Comments:

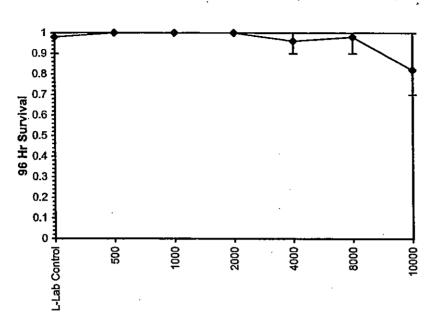
**BMSA** 

Protocol: ASTM 1999

**Test Species:** 

Industrial Product HA-Hyalella azteca

Dose-Response Plot



### Appendix Table C-5c. Water Quality Summary for 96-hour *Hyalella azteca*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 12 December 2002

Concentration	_		Live	_	Disso	olved O					рН					onduct				Те	mperat	ure		Percent
(mg/L)	Rep	Orga	nisms 96	0	24	(mg/L) 48	72	96	Ó	24	pH unit	(S)	<b>9</b> 6	0	24	umhos 48	-cm) 72	96	0	24	48	72	98	Survival
	Α	10	10	8.8	6.0	5.8	6.5	6.6	7.74	7.58	7.53	7.79	7.65	823	811	810	809	811	20.2	20.3	20.1	20.0	20,0	100
	В	10	10																7.00					100
Lab Control	Č	10	10				L.													le c		<b>翻题</b>		100
	D	10	10									77.57.2												100
	Ē	10	9					1.0													<b>N</b>			90
_	Α	10	10	8.5	5.0	6.7	6.2	6.6	7.54	7.60	7.66	7.77	7.76	957	1089	950	952	954	20.2	20.2	20.1	20.1	20.1	100
	В	10	10				F 50	5 P. P. S. S. S. S. S. S. S. S. S. S. S. S. S.				200	7.60				Y.V. 100							100
500	С	10	8							XII.														80
ľ	D	10	10		3.65						7										<b>探服影</b>			100
	E	10	10																					100
	Α	10	10	8.5	5.4	6.8	6.2	7.0	7.43	7.65	7,71	7.80	7.84	1088	1351	1093	1098	1104	20.2	20.2	20,1	20.0	20.0	100
1	В	10	10			100					e e											機器		100
1,000	Ç	10	9															4				<b>数数</b>		90
	D	10	10																					100
	Ε	10	10					<b>多多数</b>			2											<b>網網</b>		100
	Α	10	10	8.5	5.9	5.8	6.2	7.1	7.30	7.51	7.60	7.75	7.80	1355	1842	1349	1359	1368	20.2	20.3	20.0	19.9	20.0	100
	В	10	10																					100
2,000	С	10	10				0													<b>新教教</b>				100
	D	10	10																					100
	ŧΠ	10	9				( A\$ ()					المسترين المنت												90
1	Α	10	10	8.8	6.0	5.5	6.2	7.3	7.15	7.32	7.51	7.66	7.69	1858	1800	1845	1845	1849	20.3	20.3	20.1	20.0	20.0	100
	В	10	10	7.	2										3.41									100
4,000	С	10	9	. 1																				90
	D	10	10															1						100
	E	10	10								3													100
	Α	10	10	8.9	4.6	5.1	6.3	6.6	6.99	7.26	7.33	7,46	7.49	2830	2820	2810	2810	2810	20.3	20.3	20,1	20.0	20.0	100
	В	10	10			and the										e e e i i								100
8,000	С	10	10									\$0.00 pt						3. / 3 11. 3 12 12.						100
	D	10	8	ألساريا			فستنت				إلماعات				2.2.2		بالجنب والمالية							80
	E	10	9						3.5.3									فسندنذ						90
Ĺ	Α	_10	7	8.7	4.4	4.4	5.0	6.0	6.91	7.20	7.24	7.40	7.40	3330	3310	3320	3320	3330	20.3	20.3	20.1	20.0	20.1	70
[	В	10	0_		الأ في إساعيا				/ · · · · · · · · · · · · ·				2.22.22.2										100 Miles	0
10,000	С	10	10			إيريا	أد سيد در																	100
Ļ	D	10	5					-				1									100000			50
	E	10	10	الانتاليا	an Diego	2		المرديد	ال الما الماكات				اداده المحددات	أمناحيي ك	الما المالية									100

AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

			Α	mphipod 9	6-Hr Survival Bio	assay-96 Hr Surv	rival
Start Date:	12/12/2002	<u>-</u>	Test ID:	0212-134		Sample ID:	BEAZER
End Date:	12/16/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	HA-Hyalella azteca
Comments:	PSA					•	•
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	0.9000		
500	1.0000	1.0000	0.8000	1.0000	1.0000	•	
1000	1.0000	1.0000	0.9000	1.0000	1.0000	•	
2000	1.0000	1.0000	1.0000	1.0000	0.9000		
4000	1.0000	1.0000	0.9000	1.0000	1.0000		
8000	1.0000	1.0000	1.0000	0.8000	0.9000		
10000	0.7000	0.0000	1.0000	0.5000	1.0000		

••			Tra	ansform:	Arcsin Sc	juare Roof	1	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	,		1	50
500	0.9600	0.9796	1.3510	1.1071	1.4120	10.092	5	27.Ò0	16.00	2	50
1000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
2000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
4000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
8000	0.9400	0.9592	1.3184	1.1071	1.4120	10.436	5	24.50	16.00	3	50
10000	0.6400	0.6531	0.9519	0.1588	1.4120	54.632	5	21.00	16.00	18	50

Auxiliary Tests	Statistic	Critical	Skew Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.73799	0.91	-1.3824 8.25233
Bartlett's Test indicates unequal variances (p = 1.51E-05)	32.1831	16.8119	
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV	TU		
Steel's Many-One Rank Test 10000 >10000			

		_									
				Maxi	mum Likeliho	od-Probit					
Parameter	Value	SE 🕆	95% Fidu	cial Limits	Control	Chl-Sq	Critical	P-value	Mu	Sigma	lter .
Slope	14.3141	4.92484	4.66138	23.9667	0.02	0.64891	9.48773	0.96	4.028	0.06986	7 .
Intercept	-52.657	19.6219	-91.116	-14.198				•	•		
TSCR	0.024	0.00968	0.00503	0.04297		1.0 -		<u> </u>	<del></del>		
Point	Probits	mg/L	95% Fidu	cial Limits		· · ·	. ,			/ /	
EC01	2.674	7336.39	4104.53	8267.8		0.9 -		1	}	/	
EC05	3.355	8186.4	5718.1	8872.31		0.8 -			Ĭ		
EC10 :	3.718	8679.08	6798.75	9246.07		0.7:-	,		i	/ 1	
EC15	3.964	9028.13	7607.05	9549.54			٠.		J	1 l	
EC20	4.158	9315.53	8263.55	9861.73	-	<b>95</b> 0.6			!	ļ. I	
EC25	4.326	9569.38	8786.92	10235.5		요 0.5 -			l)	,	
EC40	4.747	10240.1	9687.46	11903		0.5 0.4			l li		•
EC50	5.000	10666.1	10036.9	13341				•	<b>*</b>	Į.	
EC60	5.253	11109.7	10342.9	15033.7		0.3 -			- 1	ľ	
EC75	5.674	11888.5	10823.1	18419.5		0.2 -	٠.	·	. 1	Į.	
EC80	5.842	12212.4	11011.6	19980.5		0.1	· '	. ,	//	ŀ	
EC85	6.036	12601.2	11232.1	21974.4		/ <del>-</del>		· · · · •	/ <del> </del>	l	
EC90	6.282	13108	11512.2	24776.1		0.0	40	400 40	9 (\$1.00)		
EC95	6.645	13896.8	11935.2	29611.4		,	1 10	100 10	000 100		
EC99	7.326	15507	12761.1	41403.2	•			Doco mo	_ (1	0	-

Dose mg/L

Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Start Date: 12/12/2002 End Date:

12/16/2002

Test ID: 0212-134

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: BEAZER

Sample Date: Comments:

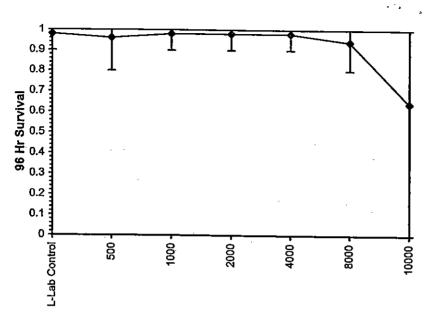
**PSA** 

Protocol: ASTM 1999

Test Species:

Industrial Product HA-Hyalella azteca

**Dose-Response Plot** 



			Α	mphipod 9	6-Hr Survival Bio	assay-96 Hr Sui	vival
Start Date:	12/12/2002	2	Test ID:	0212-1341	)	Sample ID:	BEAZER
End Date:	12/16/2002	2	Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	INDUSTRIAL
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	HA-Hyalella azteca
Comments:	PSA - w/o	possible	e outlier in	high conc			
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	0.9000	•	۵
500	1.0000	1.0000	0.8000	1.0000	1.0000		
1000	1.0000	1.0000	0.9000	1.0000	1.0000		
2000	1.0000	1.0000	1.0000	1.0000	0.9000		
4000	1.0000	1.0000	0.9000	1.0000	1.0000		
8000	1.0000	1.0000	1.0000	0.8000	0.9000		
10000	0.7000	1.0000	0.5000	1.0000			

		_	Tra	ansform:	Arcsin Sc	uare Root	:	Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			1	50
500	0.9600	0.9796	1.3510	1.1071	1.4120	10.092	5	27.00	16.00	2	50
1000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
2000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
4000	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	16.00	1	50
8000	0.9400	0.9592	1.3184	1.1071	1.4120	10.436	5	24.50	16.00	3	50
10000	0.8000	0.8163	1.1501	0.7854	1.4120	27.286	4	16.00	10.00	8	40

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	-normal dis	stribution (p	o <= 0.01)		0.85416	0.908	-0.7242	1.59501
Bartlett's Test indicates equal var	iances (p =	: 0.02)			14.9711	16.8119		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤU				
Wilcoxon Rank Sum Test	10000	>10000						

•	-	·	Max	kimum Likeliho	od-Probit		·	·	·	
Parameter	Value	SE	95% Fiducial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	9.01909	5.16552	-1.1053 19.1435	0.02	0.64896	9.48773	0.96	4.10135	0.11088	7
Intercept	-31.99	20.5378	-72.245 8.26372							
TSCR	0.024	0.00968	0.00503 0.04297		1.0 -				<del>,                                    </del>	
Point	Probits	mg/L	95% Fiducial Limits		0.9				/	
EC01	2.674	6972.92			-			j		
EC05	3.355	8298.05			0.8 -			ł	h	
EC10	3.718	9104.53			0.7 -					
EC15	3.964	9692.49	•		9.06				ŀ	
EC20	4.158	10186.7	•		0.6 0.5 0.4			- 1		
EC25	4.326	10630.8			<u>8</u> 0.5 -	1		1		
EC40	4.747	11837.5	•		<b>2</b> 0.4 -	l		ı		
EC50 .	5.000	12628.5	j		0.3 -	1		- 1		
EC60	5.253	13472.3				ł	_	1		
EC75	5.674	15001.5	j		0.2 -	<u> </u>	•	•		
EC80	5.842	15655.5	5		0.1 -	ł		- 1	1	
EC85	6.036	16453.8	3		0.0 -	<u>i</u>	. •	·		
EC90	6.282	17516.4	<b>,</b>			1 10	100 1	1000 1000	0 10000	
EC95	6.645	19218.8	•			, 10	IUŲ	1000 1000	0	
EC99	7.326	22871.1					Dose n	M	•	

Dose mg/L

Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Start Date: End Date:

12/12/2002 12/16/2002 Test ID: 0212-134b

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: BEAZER **INDUSTRIAL** 

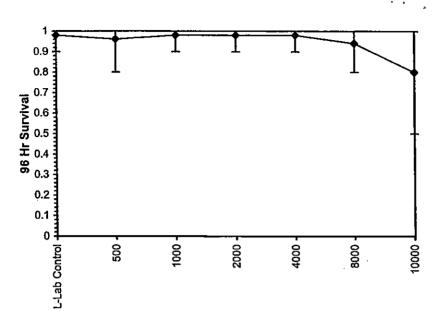
Sample Date: Comments:

Protocof: ASTM 1999 PSA - w/o possible outlier in high conc

**Test Species:** 

HA-Hyalella azteca

**Dose-Response Plot** 



Chironomus tentans
Acute Exposure

### Appendix Table C-6a. Water Quality Summary for 96-hour *Chironomus tentans*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 12 December 2002

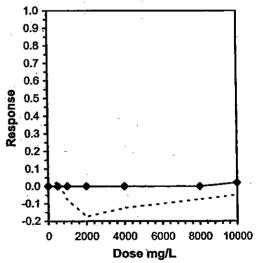
Concentration	Rep		Live nisms		Diss	olved C mg/L)					pH (pH uni	ite\				onduc			·	Te	mpera (°C)	ture		Percei
(mg/L)	1,,,,	o	96	0	24	48	<i>,</i> 72	96	O	24	48	13)	96	O	24	48	72	96	O	24	48	72	96	Surviv
	Α	10	9	8.4	7.5	4.0	8.4	4.5	7.74	7.54	7.48	7.99	7.37	823	845	841	842	854	20.2	20.3	20.5	19.9		90
	В	10	8																	20.0	20.0		20.	80
Control	С	10	9				1 / 3 / 5 -	VV.				- XA (A	1											90
	D	10	6			(,) /- /					17.27	10.15	1											60
	E	10	8							7.11	100			1	N. 70							20.0		80
	Α	10	6	8.0	8.2	3.8	8.4	4.1	7.82	7.83	7.60	8.29	7.52	1095	1081	1083	1085	1099	20.4	20.1	20.2	19.8	20.1	60
	В	10	8		70.00			15:50							73/11									80
500	С	10	8															2,000,000 3,000,000 3,000,000					BIOCES INC.	80
İ	D	10	8																			Company (SC)		80
	Е	10	9		. V. 73. ()					72.5														90
	Α	10	9	8.3	8.0	3.0	8.2	3.9	7.87	7.88	7.59	8.36	7.63	1352	1328	1313	1323	1338	20.3	20.1	20.2	19.8	20.1	90
ſ	В	10	8						1		<b>5</b> 15 5										228			80
1,000	C	10	9																		7 67 7			90
[	D	10	8																					80
	Ε	10	9									<b>Sec.</b>						<b>100</b>					1916	90
	Α	_10	8	8.5	8.2	3.2	8.2	4.2	7.57	7.93	7.57	8.31	7.70	1828	1827	1828	1827	1849	20.0	20.0	20.2	19.8	20.0	80
[	В	10	10																					100
2,000	С	10	9															7.5				<b>10</b>		90
	D	10	10							10				73	7.7								7	100
	Е	10	10																3 (Sp. 1)			200		100
	Α	10	10	8.5	3.6	3.6	8.2	3.2	7.98	7.60	7.71	8.41	7.66	2860	2770	2760	2750	2780	20.1	20.0	20.2	19.8	20.0	100
	В	10	10																		2152			100
4,000	С	10	8																					80
	D	10	8							288								100			(2.00c)			80
	E	10	9																					90
	Α	10	9	8.6	3.4	3.5	8.3	4.7	7.99	7.60	7.70	8.45	7.71	4800	4560	4550	4540	4560	19.8	20.0	20.2	19.7	20.0	90
	В	10	9																					90
8,000	С	10	7		()																			70
	D	10	8		2.00																			80
	E	10							1. A.		9.54													100
<b>]</b>	A	10		8.6	3.2	3.0	8.1	4.1	7.97	7.58	7.62	8.41	7.70	5730	5420	5040	5410 5	5440	20.2	19.9	20.0	19.8	19.9	70
. <u>.</u>	В	10			le de	i.																		90
10,000	<u> </u>	10	8																				<b>沙</b> 拳	80
	<u>.</u>	10	9	0.750.2			2								22.0									90
IEC Bloassay Laborat	<u> </u>	10	9	Lone L															37/					90

				Chire	onomus tentans-	96 Hr Survival	
Start Date:	12/12/2002	-	Test ID:	0212-138		Sample ID:	BEAZER
End Date:	12/16/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	CT-Chironomus tentans
Comments:	BMDSA						
Conc-mg/L	1	2	3	4	5		
L-Lab Control	0.9000	0.8000	0.9000	0.6000	0.8000	· •	•
500	0.6000	0.8000	0.8000	0.8000	0.9000		
1000	0.9000	0.8000	0.9000	0.8000	0.9000		
2000	0.8000	1.0000	0.9000	1.0000	1.0000		•
4000	1.0000	1.0000	0.8000	0.8000	0.9000		
8000	0.9000	0.9000	0.7000	0.8000	1.0000		•
10000	0.7000	0.9000	0.8000	0.9000	0.9000		

			Tra	ansform:	Arcsin Sq	uare Root			1-Tailed		Isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.8000	1.0000	1.1197	0.8861	1.2490	13.274	5				0.8567	1.0000
500	0.7800	0.9750	1.0913	0.8861	1.2490	11.926	5	0.334	2.409	0.2047	0.8567	1.0000
1000	0.8600	1.0750	1.1923	1,1071	1.2490	6.519	5	-0.854	2.409	0.2047	0.8567	1.0000
2000	0.9400	1.1750	1.3184	1.1071	1.4120	10.436	5	-2.338	2.409	0.2047	0.8567	1.0000
4000	0.9000	1.1250	1.2575	1.1071	1.4120	12.128	5	-1.621	2.409	0.2047	0.8567	1.0000
. 8000	0.8600	1.0750	1.2017	0.9912	1.4120	13.288	5	-0.965	2.409	0.2047	0.8567	1.0000
10000	0.8400	1.0500	1.1691	0.9912	1.2490	10.000	5	-0.581	2.409	0.2047	0.8400	0.9805

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribi	ution $(p > 0)$	.01)		0.93954		0.91		-0.4392	-0.8049
Bartlett's Test indicates equal var	iances (p =	= 0.90)			2.16123		16.8119			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	10000	>10000			0.18181	0.22447	0.03021	0.01806	0.16469	6, 28

		-	Line	ear Interpolat	tion (200 I	Resamples	)	
Point	mg/L	SD	95% CL(Exp)	Skew				•
1C05	>10000		•					
IC10	>10000			•	•		•	
IC15	>10000					1.0	<del></del>	· · · · · · · · · · · · · · · · · · ·
IC20	>10000		**			0.9		•
IC25	>10000					0.8		
IC40	>10000					4		
IC50	>10000			<u> </u>		0.7		
						0.6		



Page 1

Chironomus tentans-96 Hr Survival Test ID: 0212-138 Sample ID: BEAZER Lab ID: AEESD-AMEC Bioassay SD Sample Type: **Industrial Product** 

Start Date: End Date: Sample Date:

12/12/2002

12/16/2002

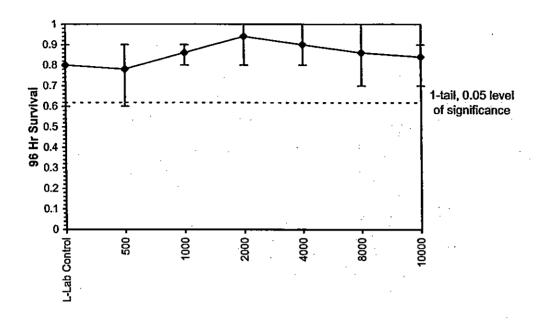
Protocol: ASTM 1999

**Test Species:** 

CT-Chironomus tentans

Comments: **BMDSA** 

Dose-Response Plot



### Appendix Table C-6b. Water Quality Summary for 96-hour *Chironomus tentans*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 12 December 2002

Concentration	Bar		Live		Disso	olved O				,	pH pH unit	te)				onduct µmhos				Te	empera (°C)	ture		Percen
(mg/L)	Rep	Olga	nisms 96	0	24	(mg/L) 48		96	0	24	48	72	96	o	24	48	72	96	Ö	24	48	72	96	Surviv
	Α	10	8	8.8	7.5	2.5	8.1	4.4	7.80	7.84	7.39	7.53	7.48	819	845	843	844	864	20.3	20.3	20.0	19.6	20.0	80
	В	10	7		10.2		.50			** Y 7						W.5				1800				70
Control	С	10	8		i i																E1 E			80
į	D	10	9	Z																				90
i	E	10	8					( ) ( )	23.5					7/4								T JLC		80
	Α	10	9	8.0	8.7	3.0	8.0	4.8	7.52	7.98	7.41	8.06	7.60	1011	1010	1006	1007	1030	20.6	19.8	20.2	19.4	19.9	90
	В	10	9	, it is	e Fran		17.35%	4.5																90
500	С	10	7																					70
ĺ	D	10	8															المتعدد			2.2			80
	Е	10	9																					90
	Α	10	8	8.1	8.7	3.0	8.1	5.5	7.57	8.00	7.44	8.19	7.70	1182	1174	1175	1170	1170	20,6	19.8	20.2	19.4	19.9	80
	В	10	10																	7.1.1.1.20	<b>NAME</b>			100
1,000	С	10	10																				智能器	100
	D	10	8	1019							7													80
	E	10	7																					70
	À	10	7	8.0	8.0	3.0	8.0	5.1	7.83	7.94	7.44	8.27	7.72	1529	1503	1510	1494	1528	20.5	19.8	20.3	19.3	19.9	70
	В	10	10													لے بیان دیا	ا د دا سرد			د ساداد کا				100
2,000	C	10	5											إسيا			أنسينا		\ \(\frac{1}{2}\)				建設	50
[	D	10	10																				2322	100
	Ē	10	9																					90
	Α	10	10	8.2	8.6	2.5	8.3	5.0	7.87	8.03	7.50	8.23	7.72	2230	2170	2190	2160	2200	20.5	19.8	20.3	19.4	20.0	100
	₿	10	10																			1,205		100
4,000	С	10	8									Ý												80
	D	10	8														إياسيب		فيحدد مسيا وي					80
	Ε	10	9														Liberti.			ف ات ا				90
	Α	10	9	8.2	8.8	2.9	8.6	5.0	7.89	8.10	7.51	8.27	7.74	3540	3420	3430	3390	3450	20.3	19.7	20.4	19.4	19.9	90
[	В	10	9			ن ن ر				أحسد														90
8,000	С	10	10		,														. 4					100
	D	10	10												1									100
	E	10	7							المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة ا المرجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة الم														70
	Α	10	8	8.7	8.6	4.0	8.5	5.8	7.92	8.09	7.53	8.24	7,78	4240	4080	4120	4060	4160	20.3	19.8	20.5	19.3	19.9	80
	В	10	-8		:	ا الرحم والموروع													المحمد المدر					80
10,000	С	10	9	ا د د د د د						اح <i>ا</i> ليون بر				4										90
	D	10	7					د. دمانشنده																70
	Е	10	10															النب						100

AMEC Bloassay Leboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

l	<del></del>				Chir	onomus tentans-	6 Hr Survival	
	Start Date:	12/12/2002	-	Test ID:	0212-139		Sample ID:	BEAZER
	End Date:	12/16/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product
	Sample Date:			Protocol:	ASTM 199	9	Test Species:	CT-Chironomus tentans
	Comments:	BMSA						
Į	Conc-mg/L	1	2	3	4	5	,	
	L-Lab Control	0.8000	0.7000	0.8000	0.9000	0.8000		
l.	500	0.9000	0.9000	0.7000	0.8000	0.9000		
	1000	0.8000	1.0000	1.0000	0.8000	0.7000		
	2000	0.7000	1.0000	0.5000	1.0000	0.9000		•
	4000	1.0000	1.0000	0.8000	0.8000	0.9000		
	8000	0.9000	0.9000	1.0000	1.0000	0.7000		
۲.	10000	0.8000	0.8000	0.9000	0.7000	1.0000		

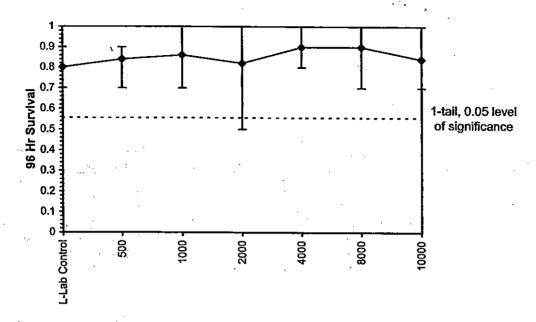
			Tra	ansform:	Arcsin Sc	uare Roof	t	_	1-Tailed	•	isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.8000	1.0000	1.1123	0.9912	1.2490	8.222	5				0.8533	1.0000
500	0.8400	1.0500	1.1691	0.9912	1.2490	10.000	5	-0.513	2.409	0.2667	0.8533	1.0000
1000	0.8600	1.0750	1.2059	0.9912	1.4120	16.090	5	-0.845	2.409	0.2667	0.8533	1.0000
2000	0.8200	1.0250	1.1699	0.7854	1.4120	23.537	5	-0.520	2.409	0.2667	0.8533	1.0000
4000	0.9000	1.1250	1.2575	1.1071	1.4120	12.128	5	-1.311	2.409	0.2667	0.8533	1.0000
8000	0.9000	1.1250	1.2627	0.9912	1.4120	13.643	5	-1.358	2.409	0.2667	0.8533	1.0000
10000	0.8400	1.0500	1.1733	0.9912	1.4120	13.786	5	-0.551	2,409	0.2667	0.8400	0.9844

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates norr	nal distribu	ıtion (p > 0	.01)		0.96172		0.91		-0.2871	-0.5073
Bartlett's Test indicates equal vari	ances (p =	= 0.50)			5.3433		16.8119			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	10000	>10000		•	0.24406	0.30351	0.01431	0.03066	0.82685	6, 28

Linear Interpolation (200 Resamples) SD 95% CL(Exp) **Point** mg/L Skew IC05 >10000 IC10 >10000 IC15 >10000 1.0 IC20 >10000 0.9 IC25 >10000 8.0 IC40 >10000 0.7 IC50 >10000 0.6

Chironomus tentans-96 Hr Survival Start Date: 12/12/2002 Test ID: 0212-139 Sample iD: **BEAZER** Lab ID: AEESD-AMEC Bioassay SD Sample Type: 12/16/2002 End Date: Industrial Product Sample Date: Protocol: ASTM 1999 **Test Species:** CT-Chironomus tentans Comments: **BMSA** 

Dose-Response Plot



#### Appendix Table C-6c. Water Quality Summary for 96-hour *Chironomus tentans*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 12 December 2002

Concentration	Rep		Live nisms		Disso	olved C (mg/L	)xygen	•		(	pH pH uni	ts)				onduc				Te	mperat	ure		Percer
(mg/L)	, , , , ,	Ø	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	Surviv
-	Α	10	8	8.8	7.5	2.5	8.1	4.4	7.80	7.84	7.39	7.53	7.46	819	845	843	844	864	20.3	20.3	20.0	19.6		80
	В	10	7			jirtə İlə																		70
Control	С	10	8		×	39.5											11							80
	D	10	9				1									7-1 -1 150								90
	Ē	10	8											1									<b>投資</b> 股	80
	Α	10	10	8.5	4.5	3.4	8.1	5.8	7.54	7.57	7.51	7.81	7.76	957	964	964	957	983	20.2	20.0	20.5	19.3	20.0	100
	В	10	10																					100
500	0	10	9																	1			<b>新教教</b>	90
	D	10	10				10	7.7												W. 5				100
	Ε	10	8																					80
	Α	10	9	8.5	4.8	3.5	8.6	5.5	7.43	7.65	7.59	7.93	7.82	1351	1113	1109	1103	1130	20.2	19.9	20.5	19.2	20.0	90
	В	10	9														10.23,730						<b>100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100</b>	90
1,000	С	10	8																					80
[	D	10	9				2																	90
	E	10	8																					80
	Α	10	5	8.5	4.0	5.0	8.6	5.2	7.30	7.60	7.66	7.92	7.87	1355	1340	1347	1341	1377	20.2	20.2	19.9	19.3	20.0	50
	В	10	6																					60
2,000	С	10	8			11.5	3/4										W. Jul							80
	D	10	7																					70
	Ε	10	10																					100
	Α	10	8	8.8	3.6	4.7	8.5	5.0	7.15	7.47	7.64	7.81	7.77	1858	1815	1828	1825	1864	20.3	20.1	19.8	19.3	20.0	80
	В	10	7																	<b>郑朝</b> 君				70
4,000	С	10	8									<b>数数</b>												80
	D	10	6																					60
	Е	10	7																			3.68		70
	Α	10	9	8.9	4.0	5.0	8.0	5.6	6.99	7.46	7.56	7.69	7.69	2830	2730	2750	2750	2820	20.3	20.1	19.8	19,4	20.0	90
	В	10	9																					90
8,000	С	10	8					2																80
	D	10	7					WY ST																70
	Е	10	8				60		2000	3.00			8.3		1.6									80
	Α	10_	9	8.7	2.2	3.5	7.0	4.4	6.91	7.35	7.48	7.63	7.62	3330	3200	3220	3230	3300	20.3	19.9	19.6	19.4	19.9	90
	В	10	8								ev rendi				erate in Art									80
10,000	С	10	7								المناسبة المناسبة	14												70
	D	10	9																					90
	E	10	8																					80

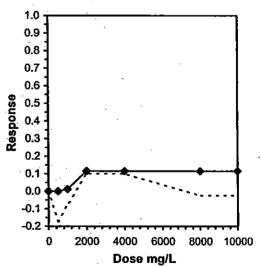
AMEC Bloassay Laboratory - 5550 Morehouse Dr., Suite 8 San Diego, CA 92121.

				Chir	onomus tentans-	96 Hr Survival	
Start Date:	12/12/2002		Test ID:	0212-137		Sample ID:	BEAZER
End Date:	12/16/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	CT-Chironomus tentans
Comments:	PSA					•	
Conc-mg/L	1	2	3	4 .	5		
L-Lab Control	0.8000	0.7000	0.8000	0.9000	0.8000	-	
500	1.0000	1.0000	0.9000	1.0000	0.8000		
1000	0.9000	0.9000	0.8000	0.9000	0.8000		
2000	0.5000	0.6000	0.8000	0.7000	1.0000		
4000	0.8000	0.7000	0.8000	0.6000	0.7000		
8000	0.9000	0.9000	0.8000	0.7000	0.8000		
10000	0.9000	0.8000	0.7000	0.9000	0.8000		

			Tra	ansform:	Arcsin Sc	uare Root			1-Tailed		Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.8000	1.0000	1.1123	0.9912	1.2490	8.222	5				0.8700	1.0000
500	0.9400	1.1750	1.3184	1.1071	1.4120	10.436	5	-2.444	2.409	0.2032	0.8700	1.0000
1000	0.8600	1.0750	1.1923	1.1071	1.2490	6.519	5	-0.948	2.409	0.2032	0.8600	0.9885
2000	0.7200	0.9000	1.0364	0.7854	1,4120	23.325	5	0.901	2.409	0.2032	0.7700	0.8851
4000	0.7200	0.9000	1.0165	0.8861	1.1071	9.166	5	1.136	2.409	0.2032	0.7700	0.8851
8000	0.8200	1.0250	1.1407	0.9912	1.2490	9.612	-5	-0.336	2.409	0.2032	0.7700	0.8851
10000	0.8200	1.0250	1.1407	0.9912	1.2490	9.612	5	-0.336	2.409	0.2032	0.7700	0.8851

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.94845		0.91	=	0.42821	1.51698
Bartlett's Test indicates equal var	iances (p =	= 0.27)			7.6062		16.8119			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TŪ	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	10000	>10000		•	0.18161	0.22585	0.05105	0.01779	0.02625	6, 28

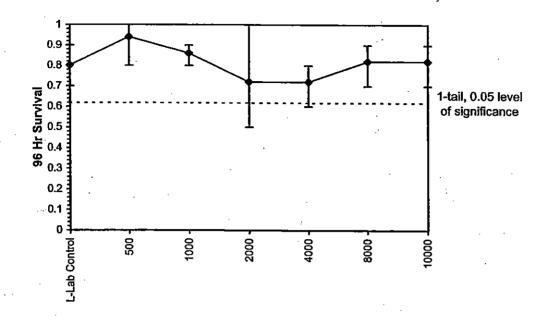
Point	mg/L	SD	Line 95% CL(Exp)	ear Interpolation (200 Resamples) Skew
IC05	1372.22		-	
IC10	1855.56			
IC15	>10000		•	1.0
IC20	>10000			0.9
IC25	>10000		•	∵ 4
IC40	>10000			0.8
IC50	>10000			0.7 -
				0.6



Chironomus tentans-96 Hr Survival

12/12/2002 Test ID: 0212-137 Sample ID: BEAZER
12/16/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product
Protocol: ASTM 1999 Test Species: CT-Chironomus tentans

Dose-Response Plot



Start Date:

End Date:

Sample Date:

PSA

Comments:

### Appendix Table C-6d. Water Quality Summary for 96-hour *Chironomus tentans*Exposure to Resorcinol (RES)

Initiated: 12 December 2002

Concentration	Rep		Live Inisms		Disso	olved C (mg/L	) ) )	•			pH pH uni	ts)	·			onduc		_		Te	mperat	ture	-	Percer
(mg/L)	' ' '	o	96	0	24	48	72	96	Ó	24	48	72	96	0	24	48	72	96	ñ	24	48	72	96	Surviv
	Α	10	9	8.4	7.5	4.0	8.4	4.5	7.74	7.54		7.99	7.37	823	845	841	842	854	20.2	20.3	20.5	19.9		90
	В	10	8						V (2)		12.55													80
Control	Ç	10	9	7 a 19							1000						1. T. J. T.		8					90
	۵	10	6																					60
	ш	10	8																		* V.C.			80
	Α	10	7	9.5	5.4	4.2	7.8	2.4	8.07	7,42	7.53	7.34	7.25	818	822	817	824	823	20.4	19.9	19.9	19.8	19.9	70
	В	10	6			00 00 00 10 00 00 00				i .														60
100	C	10	10							v (6 y)									3.17					100
	D	10	4				1.00										,							40
	E	10	6																					60
1	Α	10	1	9.2	4.7	3.5	8.0	1.1	7.95	7.53	7.54	7.41	7.34	803	815	806	818	823	20.5	19.9	20.0	19.9	20.0	10
į	В	10	0	11,775																			<b>新教教</b>	0
250	<u> </u>	10	1				أحديث						1,7											10
1	D	10	1																					10
	E	10	_1															3.						10
	Α.	10	0	9.1	4.0	5.1	7.4	0.7	7.84	7.53	7.59	7.56	7.36	785	783	792	797	798	20.5	20.0	20.0	20.0	20.0	0
	В	10	0					9.35													1		<b>经</b>	0
500	С	10	0	27				100				\$140 E										1		0
L	D	10	0				1			نات د									100 25 4					0
	Ε	10	0	3.45		3.35													\$30.0F		装装			0
Ļ	Α	10	0	8.7	3.9	4.9	8.1	0.9	7.69	7.58	7.62	7.74	7.46	762	763	782	787	791	20.3	19.8	20.0	20.0	20.0	0
	_В	10	0					أنتك شده														翻棋		0
750	С	10	· 0		ا ددالتوروس	النب ال																		0
1	D	10	0																					0
	E	10	0		Z.Z.sv.		الكحا	فمندمد	المراجعة المست		1													0
<u> </u>	Α	10	0	9.1	6.0	4.9	8.3	5.5	7.63	7.76	7.65	7.82	7.97	742	743	766	772	775	20.5	19.8	20.0	20.1	20.1	Ó
	В	10	0							ارات الد، عند														0
1,000	C	10	0																					0
<u> </u>	D	10	0																					0
<del></del>	Е	10	0								المر بالارساء													0
Ļ	<u>A</u>	10	0	9.0	7.8	6.6	8.3	6.1	7.47	7.79	7.67	7.79	7.93	666	675	696	700	703	20.5	19.6	20.1	20.1	20.1	0
, , , , L	В	10	0	1			A				1						iles							0
2,000	C	10	0			إيست	أأربانم																	0
Į_	<u>D</u>	10	0		وأنت المرات					اً عاد يعاد	J	الدد											<b>基礎</b>	0
IEC Bloassay Laborat	Ε	10	0		1153								الند											0

AMEC Bloassey Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

				Chir	onomus tentans-	96 Hr Survival	
Start Date:	12/1 <del>2</del> /2002	٠.	Test ID:	0212-140		Sample ID:	BEAZER
End Date:	12/16/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	CT-Chironomus tentans
Comments:	RES						
Conc-mg/L	1	2	3	4	5		
L-Lab Control	0.9000	0.8000	0.9000	0.6000	0.8000		
100	0.7000	0.6000	1.0000	0.4000	0.6000		
250	0.1000	0.0000	0.1000	0.1000	0.1000	•	
500	0.0000	0.0000	0.0000	0.0000	0.0000		
750	0.0000	0.0000	0.0000	0.0000	0.0000		
1000	0.0000	0.0000	0.0000	0.0000	0.0000		
2000	0.0000	0.0000	0.0000	0.0000	0.0000		

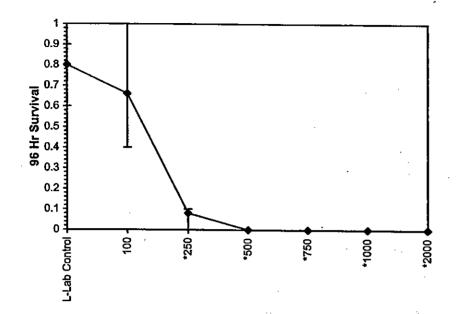
		_	Tra	Transform: Arcsin Square Root				Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	0.8000	1.0000	1.1197	0.8861	1.2490	13.274	5			10	50
100	0.6600	0.8250	0.9720	0.6847	1.4120	27.762	5	22.00	16.00	17	50
*250	0.0800	0.1000	0.2892	0.1588	0.3218	25.205	5	15.00	16.00	46	50
*500	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	16.00	50	50
*750	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	16.00	50	50
*1000	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	16.00	50	50
*2000	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	15.00	16.00	50	50

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	-normal dis	tribution	(p <= 0.01)	-	0.69574	0.91	1.21124	8.89274
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤÜ				
Steel's Many-One Rank Test	100	250	158.114					

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Ite
Slope	5.67573	1.10484	3.51024	7.84121	0.2	0.0626	9.48773	1	2.16818	0.17619	3
Intercept	-7.306	2.49343	-12.193	-2.4188							
TSCR	0.2013	0.05646	0.09063	0.31196		1.0 -				<del></del>	
Point	Probits	mg/L	95% Fidu	cial Limits		0.0	Ì				
EC01	2.674	57.3191	26.0136	83.2878		0.9 - -			<b>/7</b> /		
EC05	3.355	75.5738	40.2859	102.727		0.8 -	1				
EC10	3.718	87.5752	50.7482	115.146		0.7 -	1	- 1	11		
EC15	3.964	96.7316	59.2189	124.537			1	- 1	ll .		
EC20	4.158	104.687	66.8747	132.691		<b>.</b> 0.6 -	ł	- 11	[]	i	
EC25	4.326	112.031	74.1525	140.25		Response 0.6	1				
EC40	4.747	132.904	95.6412	162.207		S	ł	- 11	1		
EC50	5.000	147.291	110.812	178.078		₩ 0.4	1	H		i	
EC60	5.253	163.235	127.562	196.771		0.3	1	- 111		Į.	
EC75	5.674	193.648	158.094	236.838			1	- 111			
EC80	5.842	207.234	170.815	256.901		0.2	1	/∳/			
EC85	6.036	224.277	185.915	284.002	·	0.1 ·	1	- / <b>I</b> I		ŀ	
EC90	6.282			324.614		0.0	1	<u> </u>			
EC95	6.645	287.066	234.976	400.434		0.0	1 . 10	100	1000	10000	
EC99	7.326	378.489	295.942	607.303			i 'N	Dosen		13000	

Chironomus tentans-96 Hr Survival Start Date: 12/12/2002 Test ID: 0212-140 Sample ID: BEAZER End Date: Lab ID: AEESD-AMEC Bioassay SD Sample Type: 12/16/2002 industrial Product Sample Date: Protocol: ASTM 1999 **Test Species:** CT-Chironomus tentans Comments: RES

**Dose-Response Plot** 



Chironomus tentans
Chronic Exposure

# Appendix Table C-7. Water Quality Summary for 10-day *Chironomus tentans*Exposure to Resorcinol (RES)

Initiated: 12 December 2002

**Concentration: Control** 

Test Day	pH (pH units)	Conductivity (umnos/cm)	Dissolved O _z (mg/L)	Temperature (°C)
0	7.74	823	8.4	20.2
1	7.51	813	3.0	19.5
2	7.41	833	3.7	20.1
3	7.63	838	8.1	20.1
4	7.56	836	3.9	20.1
5	7.89	836	7.9	20.0
6	8.20	848	8.5	20.0
7	8.18	835	8.5	19.8
8	8.28	840	6.0	20.0
9	8.15	842	8.6	19.8
10	8.21	848	8.6	19.7

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## Appendix Table C-7 (con'd). Water Quality Summary for 10-day *Chironomus tentans*Exposure to Resorcinol (RES)

Initiated: 12 December 2002

Concentration: 100 mg/L

Test Day	pH (pH units)	Conductivity (umhos/cm)	Dissolved O ₂	Temperature (°C)
0	8.07	818	9.5	20.4
1	7.46	815	3.9	19.7
2	7.37	835	3.3	20.0
3	7.52	838	7.6	20.1
4	7.45	844	1.5	20.1
5	7.79	843	7.1	20.0
6	8.11	850	8.3	20.0
7	8.16	842	8.4	19.8
8	8.37	853	6.0	19.9
9	8.06	864	8.1	19.7
10	8.18	877	8.5	19.6

Concentration: 250 mg/L

Test Day	pH (pH units)	Conductivity (umnos/cm)	Dissolved O ₂ (mg/L)	Temperature (°C)
0	7.95	803	9.2	20.5
1	7.47	802	3.1	19.7
2	7.43	822	3.7	20.1
3	7.43	825	7.5	20.1
4	7.40	831	1.0	20.1
5	7.65	829	6.2	19.9
6	8.03	833	8.0	20.0
7	8.15	819	8.4	19.8
8	8.35	825	6.0	19.8
9	8.15	837	8.5	19.8
10	8.31	848	8.7	19.7

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#### Appendix Table C-7 (con'd). Water Quality Summary for 10-day *Chironomus tentans* **Exposure to Resorcinol (RES)**

Initiated: 12 December 2002

Concentration: 500 mg/L

Test Day	pH (pH units)	Conductivity (umnos/cm)	Dissolved C ₂ (mg/L)	Temperature (°C)
0	7.84	785	9.1	20.5
1	7.49	786	3.5	19.9
2	7.53	802	4.4	20.1
3	7.75	808	: 7.8	20.1
4	7.47	814	0.8	20.1
5	7.26	815	-1.2	20.2
6	8.08	813	8.1	20.2
7	8.10	810	8.5	19.6
8	8.34	823	6.0	19.7
9	8.24	831	8.7	19.7
10	8.31	848	8.7	19.7

Concentration: 750 mg/L

Test Day	pH (pH units)	Conductivity (umnos/cm)	Dissolved O ₂ (mg/L)	Temperature (°C)
0	7.69	762	8.7	20.3
1	7.52	749	3.0	19.9
2	7.52	787	4.1	20.1
3	7.78	794	8.0	20.1
4	7.53	799	0.6	20.1
5	8.18	801	8.0	20.0
6	8.20	803	8.2	20.0
7	8.13	803	8.5	19.6
8	8.31	811	6.0	19.7
9	7.97	823	8.4	19.7
10	8.24	842	8.7	19.6

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## Appendix Table C-7 (con'd). Water Quality Summary for 10-day *Chironomus tentans*Exposure to Resorcinol (RES)

Initiated: 12 December 2002

Concentration: 1000 mg/L

Test Day	pH (pH units)	Gonductivity (umhos/cm)	Dissolved O ₂ (mg/L)	Temperature (°C)
0	7.63	742	9.1	20.5
1	7.67	759	5.4	20.0
2	7.51	762	3.7	20.1
3	7.79	769	8.0	20.1
4	7.86	777	5.0	20.1
5	7.50	774	6.2	20.2
6	8.04	773	8.5	19.9
7	8.05	770	8.5	19.7
8	8.16	777	6.0	19.7
9	8.06	787	8.5	19.7
10	8.16	797	8.5	19.6

Concentration: 2000 mg/L

Test Day	pH (pH units)	Conductivity (umnos/cm)	Dissolved O ₂ (mg/L)	Temperature (°C)
0	7.47	666	9.0	20.5
1	7.74	612	7.8	20,1
2	7.58	687	6.7	20.1
3	7.75	694	8.0	20.1
4	7.81	700	4.8	20.3
5	7.62	700	3.9	20.2
6	8.11	703	8.3	20.0
7	8.12	699	8.6	19.8
8	8.24	708	6.2	19.8
9	8.06	720	8.8	19.8
10	8.09	727	8.7	19.7

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## Appendix Table C-8. Growth data for 10-day *Chironomus tentans*Exposure to Resorcinol (RES)

Initiated: 12 December 2002

#### Time Zero Weights

	Replicate	No. Chironomus	Parl Weight (mg)	Pan + Organism Weight (mg)	Final Dry Weight per Organism (mg)	Mean Dry Weight per Organism (mg)
•	TO A	5	53.661	53,894	0.047	
	T0 B	5	52,460	52.657	0.039	1
1	T0 C	5	54.117	54.232	· 0.023	0.038
ı	T0 D	5	53.746	53.992	0.049	1
į	TO E	5	52.722	52.876	0.031	1

#### Final 10-day Weights

Conc. (mg/ & Heplicat		Pan Weight (mg)	Pan + Organism Weight (mg)	Final Dry Weight per Organism (mg):	Mean Dry Weight per Organism (ing)	Mesh Growth per Organism (mg)	
LC A	9 _	53,964	55.518	0.173			
LC B	8	51.908	53.843	0.242			
rcc	7	52.037	53.910	0.268	0.216	0.178	
LC D	. 8	52.737	54.146	0.176			
· LC E	. 4	52.536	53.415	0.220			
100 A	3	54.314	54.662	0.116			
100 B	6	53.275	54.603	0.221			
100 C	5	52.044	53.136	0.218	0.200	0.162	
100 D	6	53,963	55.365	0.234	1		
100 E	2	52.696	53.114	0,209	1	-	
250 A	0	NA	NA NA	NA			
250 B	0	NA	NA	NA NA	1		
250 C	0	NA	NA	NA	NA	NA	
250 D	0	NA .	NA NA	NA NA			
250 E	0	NA	NA NA	NA NA	1		
500 A	0	NA	NA.	NA			
500 B	0	NA	NA NA	NA NA	1	NA	
500 C	0	NA	NA NA	NA NA	NA NA		
500 D	0	NA	NA	NA NA	1		
500 E	0	NA	NA NA	NA NA	1		
750 A	0	: NA	NA.	NA NA		<del></del>	
750 B	0	NA	NA NA	NA NA			
750 C	0	NA	NA	NA NA	NA NA	NA	
750 D	0	NA	NA	NA NA	1		
750 E	Ó	NA	NA NA	NA NA			
1000 A	0	NA	NA.	NA			
1000 B	0	NA.	NA NA	NA NA	1		
1000 C	0	NA NA	NA NA	NA	NA NA	NA	
1000 D	0	NA NA	NA NA	NA	1		
1000 E	0	NA NA	NA NA	NA NA	1		
2000 A	0	NA .	NA NA	NA			
2000 B	0	NA NA	NA.	NA NA	1		
2000 C	0	NA NA	NA NA	NA NA	NA NA	NA.	
2000 D	0	NA NA	NA NA	NA NA	1		
2000 E	0	NA NA	NA NA	NA NA	1		

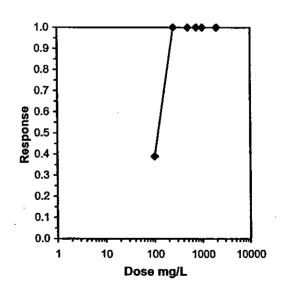
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							······································		
Chironomus tentans-% Survival									
Start Date:	12/12/2002			0212-141		Sample ID:	BEAZER		
End Date:	12/22/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product		
Sample Date:			Protocol:	<b>ASTM 199</b>	99	Test Species:	CT-Chironomus tentans		
Comments:	RES					-			
Conc-mg/L	1	2	3	4	5				
L-Lab Control	0.9000	0.8000	0.7000	0.8000	0.4000		4		
100	0.3000	0.6000	0.5000	0.6000	0.2000				
250	0.0000	0.0000	0.0000	0.0000	0.0000				
500	0.0000	0.0000	0.0000	0.0000	0.0000				
750	0.0000	0.0000	0.0000	0.0000	0.0000				
1000	0.0000	0.0000	0.0000	0.0000	0.0000				
2000	0.0000	0.0000	0.0000	0.0000	0.0000				

		_		Transform: Untransformed					1-Tailed	<del></del>	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
L-Lab Control	0.7200	1.0000	0.7200	0.4000	0.9000	26.716	5			0.7200	0.0000
100	0.4400	0.6111	0.4400	0.2000	0.6000	41.286	5	18.00	16.00	0.4400	0.3889
*250	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5	15.00	16.00	0.0000	1.0000
*500	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5	15.00	16.00	0.0000	1.0000
*750	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5	15.00	16.00	0.0000	1.0000
*1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5	15.00	16.00	0.0000	1.0000
*2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5	15.00	16.00	0.0000	1.0000

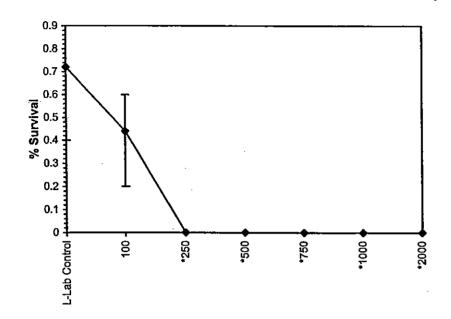
Auxiliary Tests					Statistic	_	Critical	Skew	Kurt	٠.
Shapiro-Wilk's Test indicates non	-	0.6831		0.91	-1.4225	5.32795				
Equality of variance cannot be co	nfirmed									
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TŪ	<del> · · · · · · · · · · · · · · · · · ·</del>					
Steel's Many-One Rank Test	100	250	158.114							•

				Trimmed Spearman-Karber
Trim Level	EC50	95%	CL	•
0.0%			·· <del>- ·</del>	<del></del> _
5.0%				
10.0%				1.0 —
20.0%				
Auto-38.9%	118.13	69.19	201.68	0.9



Chironomus tentans-% Survival 12/12/2002 Test ID: 0212-141 Start Date: Sample ID: BEAZER End Date: 12/22/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product Sample Date: Protocol: ASTM 1999 **Test Species:** CT-Chironomus tentans Comments: RES





	Chironomus tentans-Weight														
Start Date:	12/12/2002		Test ID:	0212-141		Sample ID:	BEAZER								
End Date:	12/22/2002		Lab ID:	AEESD-A	MEC Bioassay SD	Sample Type:	Industrial Product								
Sample Date:			Protocol:	<b>ASTM 199</b>	9	Test Species:	CT-Chironomus tentans								
Comments:	RES					,	•								
Conc-mg/L	1	2	3	4	5										
L-Lab Control	0.0017	0.0024	0.0023	0.0018	0.0022										
100	0.0012	0.0022	0.0022	0.0023	0.0021										

		_	•	Transform: Untransformed					1-Tailed		Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	0.0021	1.0000	0.0021	0.0017	0.0024	15.195	5				0.0021	1.0000
100	0.0020	0.9605	0.0020	0.0012	0.0023	23.839	5	0.321	1.860	0.0005	0.0020	0.9605

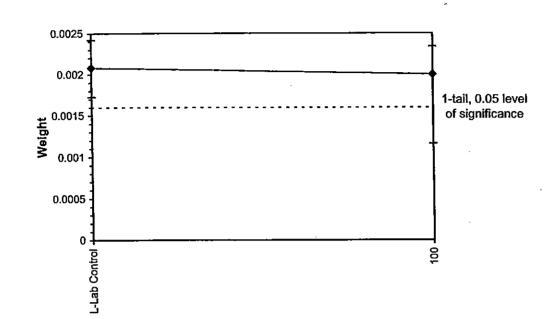
Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.81993		0.781		-1.3941	1.34808
F-Test indicates equal variances (p = 0.45)	2.27103		23.1539			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.00048	0.22854	########	#######################################	0.75637	1, 8

			Line	ear Interpolation	n (200 Resample:	s)				
oint	mg/L	SD	95% CL(Exp)	Skew	•	•				
C05	>100				•					
C10	>100									
C15	>100				1.0 —					
C20	>100				-					
C25	>100				0.9					1
C40	>100				0.8 -					
C50	>100				0.7					- 1
				·	4					
					9.0.6 - 0.5 - 0.4 -					- 1
•					្តី 0.5					l
					<u>8</u>					
					<b>2</b> 0.4 −					1
					0.3 -					
					0.2					l
					4					- 1
					0.1 -					
					0.0 1	· .				<b></b>
					0	20	40	60	80	100

Dose mg/L

Chironomus tentans-Weight Sample ID: BEAZER Test ID: 0212-141 Start Date: 12/12/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: Industrial Product 12/22/2002 End Date: Protocol: ASTM 1999 **Test Species:** CT-Chironomus tentans Sample Date: <u>RE</u>S Comments:

Dose-Response Plot



Culex pipiens

### Appendix Table C-9a. Water Quality Summary for 96-hour *Culex pipiens*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 15 April 2003

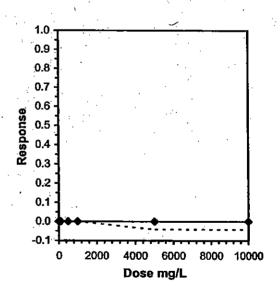
Concentration	Rep			ımbei Orgai				Disso	ived O (mg/L)					pH pH unit			<u>(µ</u>	nducth mnos-c	<u>m)</u>			mperal (°C)	_	96	Percen Surviva
(mg/L)	IVOD	b	24	48	72	96	0	24		72	98	0	24	4	72	-	******	48	-	20.0		_	20.6	20.9	80
	A ·	- 5	5	5	4	4	9.7	5.6	7.0	5.6	5.5	7.90	7.74	7.65	7.37	7.36	170	174	181	20.0	20.0	20.7	20.0	20,0	100
	В	5	5	5	5	5							4				<u>.                                    </u>			l		د د ال	ika ana atau	L.	80
Lab Control	C	5	5	4	4	4							ļ		사 (1) # 구구 (#				la <del>.</del>		واصالح	.l			100
	D	5	5	5	5	5						ļ! 	Harrier			i	<u> </u>			i		-	1		100
	E	5	5	5	5	5	in the second	i				Ì	da sia	120. ai			W		400	00	00.7	20.6	20.6	20.8	80
	Α	5	5	5	4	4	9.7	5.4	6,9	5.5	6.1	7,78	7.76	7,68	7.41	7.42	176	181	188	20,	20.7	20.0	20,0	20.0	100
	В	5	5	5	5	5			i 54.			ļ				() ()				il			ر د دستان		100
10	С	5	5	5	5	5					9	1				i		ļi	i.						100
	D	5	5	5	5	5	<u> </u>															j			80
	E	5 .	4.	4	4	4			_	( 		l	مدينة فأه			2			944	40	9 20:7	20.6	20.5	20.7	100
	Α	5	5	5	5	5	9.7	6.2	8.1	6.3	6.4	7,79	7,78	7,91	7.59	7.47	232	235	241	19.	9 20:4	20.0	20.3	20.7	100
	В	5	5	5	5	5			1			ļļ		ļ			<u> </u>	ļ	· ·	<u> </u>	s de la compa		1		100
100	c	5	5	5	5	5	رداد سا			! !		1				ļ	  r		<b></b>						100
- <del></del>	Б	5	5	5	5	5		1				1			السيال				in a	4	· 🖟	- <del> </del>			80
	E	5	5	5	4	4	b and				l. Listania						10	40.4	400	19.	9 20.0	3 20.5	20.5	20.7	10
· ·	A	5	5	5	5	5	9.7	5.7	7.4	5.7	6:0	7.82	7.76	7.78	7.50	7.47	432	434	436	18.	8 20.0	20.0	20.0	20.7	80
1	8	5	5	5	5	4											ļĻ			1					10
500	T 0	5	5	5	5	5			1	! #		<u> </u>						4			- Janes		R K		10
	Б	5	5	5	5	5						ij.,,			1		<b> </b>						1	1	10
	Ε	5	5	5	5	5		<u> </u>	ند بدر عاد	1								704	720	19.	9 20.	7 20.6	20.5	20,6	<b>-</b>
	Α	5	5	5	5	5	9.6	5.9	7.6	6.2	5.9	7.84	7.77	7.82	7,56	7.47	738	734	732	18.	8 ZU.	20.0	20.0		10
	В	5	5	5	5	5				ili.	1				ļ.		1	ļ					1		10
1,000	С	5	5	5	5	5		li							-		<u> </u>	de en en en en en en en en en en en en en	di	ļ	Alle are	dia.		****	80
	П	5	5	4	4	4				<u>.</u>	سيرا	्। (देशकार)	1			<u></u>	1						-		10
	E	5	5	5	5	5		() .)			is. Alexania		ederica Gladica			.1			000		9 20.	3 20.5	20.4	20.6	-
<del></del>	Α	5	5	5	5	5	9.8	5.5	6.9	5.1	5,4	7.8	3 7.66	7.72	7.44	7.48	2800	2820	2000	) IO.	.8 20.	20.0			10
	В	5	5	5	5	5			J.							ļi							ا میدورین ا		10
5,000	C	5	5	5	5	5		.i.			il Jennesi			-		Ji.				-!} . •		. 1)			10
	Б	5	5	5	5	5				ا معاہدی را		ļ		-	j.,		-			ļ					10
	E	5	5	5	5	5				1	Januari						546	5140	542	30	3 20.	6 20.5	20.4	20.8	?
	Α	5	5	5	5	5	9.6	6,1	7.8	4.5	4.6	7.9	1 7.71	7.78	7.36	7.40	5190	7 5140	513	20	20.	20.0			10
40.000	В	5	5	5	5	- 5						4 :	!: ;				4						-		10
10,000	C	5	5	5	5	5		1	اد دورد چاند																10
•	D	5	5	5	5	5						.ii													10
	Е	5	5	5	5	5			lie i		الماليات	الله			i Ima		. سناك		مستوائد	- ساني	ii	د ، وفيداد د.		طينساك	<u> </u>

			A	cute Mos	quito Larvae	Bioassay-96 Hr Surv	ival
Start Date:	04/15/2003	3	Test ID:	0304-136		Sample ID:	BEAZER
End Date:	04/19/2003	3 .	Lab ID:			Sample Type:	OTH-Other sample type
Sample Date:			Protocol: ,	ASTM 96		Test Species:	C P-Culex pipiens
Comments:	Chemical	testing - I	BMDSA D	efinative		,	T C TICK PIPIONS
Conc-mg/L	1	2	3	4	5		<u> </u>
L-Lab Control	0.8000	1.0000	1.0000	1.0000	1.0000		
10	0.8000	1.0000	1.0000	1.0000	0.8000		
100	1.0000	1.0000	1.0000	1.0000	0.8000		
500	1.0000	0.8000	1.0000	1.0000	1.0000		
1000	1.0000	1.0000	1.0000	0.8000	1.0000		
5000	1.0000	1.0000	1.0000	1.0000	1.0000	+ + +	
10000	1.0000	1.0000	1.0000	1.0000	1.0000		

			<u>Tra</u>	ansform: .	<u>Arcsin Sc</u>	<u>ua</u> re Roo	t	Rank	1-Tailed		Isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical		Mean	N-Mean
L-Lab Control	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5				0.9657	1.0000
10	0.9200	0.9583	1.2500	1.1071	1.3453	10.434	5	25.00	16.00		0.9657	1.0000
100	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5	27.50	16.00	· -	0.9657	1.0000
500	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5	27.50	16.00		0.9657	1.0000
1000	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5	27.50	16.00	* **	0.9657	1.0000
5000	1.0000	1.0417	1.3453	1.3453	1.3453	0.000	5	30.00	16.00	i i	0.9657	1.0000
10000	1.0000	1.0417	1.3453	1.3453	1.3453	0.000	5	30.00	16.00		0.9657	1.0000

Auxiliary Tests			, '	Statistic	Critical	Skew Kurt
Shapiro-Wilk's Test indicates non	-normal di	stribution (	p <= 0.01)	0.72469	0.91	-1.4473 0.90684
Equality of variance cannot be co	nfirmed					
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU		<del> ,</del>
Steel's Many-One Rank Test	10000	>10000	. 1		· · · · · · · · · · · · · · · · · · ·	

		9.		Lin	ear Interpol	ation (200 Resamples)
Point	· .	mg/L	SD	95% CL(Exp)	Skew	
IC05		>10000				
IC10		>10000	•	÷		1
IC15		>10000		•		1.0 —
IC20		>10000				· · · · · · · · · · · · · · · · · · ·
IC25	- (	>10000	•	;		0.9
IC40		>10000				0.8
IC50		>10000				07.1



#### Appendix Table C-9b. Water Quality Summary for 96-hour *Culex pipiens*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 15 April 2003

Concentration	Rep		-	imbei Orgai		i			lved O: (mg/L)	худел	_		(ı	pH oH units	s) _			nductiv	m)			mperat		na na na hairan n	Percer Surviva
(mg/L)	Νέρ					96	Ö	24	48	72	96	Ö	24	48	72	轮	0	48	****	*****	_	48			
	Α	5	5	5	5	5	9.0	5.8	7.2	6.0	5,8	7.96	7.72	7.76	7.46	7:41	175	178	184	20.3	20.7	20.6	20.6	20.9	100
	В	5	5	5	5	5			2.1										(, , , , , ,						100
Lab Control	С	5	5	5	5	5																50. C		فاندينا	100
	<u> </u>	5	5	5	5	5				ii					[										100
<i>*</i>	E	5	5	5	5	. 5																			100
	Α	5	5	5	5	5	9.1	5.6	7.3	6.1	6.0	8.03	7.73	7.77	7.55	7.54	178	185	193	20.0	20.7	20.6	20,5	20.7	100
	В	5	5	5	5	5			5 4 1. O									-		44	ļ	! 			100
10	c	5	5	5	5	5															ļ <u>.</u>				100
	Б	5	5	5	5	5					ji L														100
•	E	5.	5.	5	4	. 3		-												سنسسانة					60
	A	5	5	5	5	5	9.1	6.2	7.8	6:3	6.5	8.05	7.72	7.89	7.61	7,59	214	219	225	19.9	20.7	20.5	20,4	20.7	100
	В	5	5	5	5	5						dan i								1					100
100	c	5	5	5	5	5				i							) leg - vel								100
	<u> </u>	5	5	5	5.	5					il ::					i. I	· .:=:=		; :		ji 				100
	E	5	5	5	5	5						!; !!							1			lit Vilani			100
A	A	5	5	5	5	5	8,9	6.1	7.8	6.6	7.0	8.08	7.82	7.92	7.66	7.65	353	357	358	19.9	20.6	20.5	20.4	20.9	100
	5	5	5	5	5													l ,						100	
500	c	5	5	5	5	5								1					•	istorij.	네 발대, 하다		iL		100
	一	5	5	5	5	5	18519 T				j	].		22		, , , , , , , , , , , , , , , , , , ,	. بد				حا	Ì.,			100
	E	5	5	5	5	5		la.			1								i 		1	li, a i			100
	A	5	5	4	4	4	8.9	6.0	7.5	5.6	5.3	8.11	7.80	7.85	7.54	7.52	525	529	534	19.9	20.6	20.5	20.4	20,7	80
	8	5	5	5	5	5	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0				Ţ			Ľ.											100
1,000	c	5	4	4	4	4																	Ļ.,		80
	0	5	5	5	5	5	70.00	l.	,							Ĺ,						1.4	<u>.</u>		100
	E	5	5	5	5	5				1	Î			i								4			100
	Ā	5	5	5	5	5	8.9	5,6	8.6	4.6	5.0	8.12	7.72	7.72	7.42	7.50	1928	1919	1920	19.9	20,5	20.5	20.4	20.8	100
	H	5	4	3	2	.2					ni in in in in in in in in in in in in i				1 n 2, l.,					: !:			<u></u>	النبدا	40
5,000	<u>-</u>	5	5	5	5	5	= ==::			er er er er er er er er er er er er er e						j:				; : :::::::::::::::::::::::::::::::::::				*	100
	<u> </u>	5	5	5	5	5		1								i					j.			سينت بأ	100
	E	5	5	5	5	5						ļ'					1.44.		Y	i La ca	l				100
	Ā	5	5	5	5	5	9.0	6.0	7.7	5,8	5.0	8:11	7.75	7.81	7.51	7.32	3480	3490	3490	19.7	20.6	20.5	20.4	20.7	100
	B	5	5	4	4	4			1															200 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 -	80
10,000	- c	5	5	5	5	5	1									 						dia,	a		100
	1	5	5	5	5	5										il District	11 131 - 121 - 1					4.44			100
	F	5	5	5	4	4	100				Ų YV	11					14 1						1		80

			A	cute Mos	quito Larvae	Bioassay-96 Hr Survi	ival
Start Date:	04/15/2003	3	Test ID:	0304-137		Sample ID:	BEAZER
End Date:	04/19/2003	3	Lab ID:			Sample Type:	OTH-Other sample type
Sample Date:		1	Protocol: .	ASTM 96		Test Species:	C P-Culex pipiens
Comments:	Chemical	testing - I	3MSA Def	inative		•	
Conc-mg/L	1	2	3	4	5		
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000		· -
10	1.0000	1.0000	1.0000	1.0000	0.6000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		
500	1.0000	1.0000	1.0000	1.0000	1.0000		
1000	0.8000	1.0000	0.8000	1.0000	1.0000		
5000	1.0000	0.4000	1.0000	1.0000	1.0000		
10000	1.0000	0.8000	1.0000	1.0000	0.8000		

_	7.7.7		Tra	nsform:	Arcsin Sc	uare Roof	t :	Rank	1-Tailed		Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	ب	Resp	Number
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	5				0	25
. 10	0.9200	0.9200	1.2534	0.8861	1.3453	16.384	. 5	25.00	16.00		2	25
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	. 5·	27.50	16.00		0	25
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	5	27.50	16.00		Ō	25
1000	0.9200	0.9200	1.2500	1.1071	1.3453	10.434	5	22.50	16.00	:	2	25
5000	0.8800	0088.0	1.2132	0.6847	1.3453	24.351	5	25.00	16.00		3	25
10000	0.9200	0.9200	1.2500	1.1071	1.3453	10.434	- 5	22.50	16.00	•	2	25

Auxiliary Tests		···		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	-normal di	stribution (p	o <= 0.01)	0.73721	0.91	-2.2377	6.19159
Equality of variance cannot be co	nfirmed				•		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV TU				
Steel's Many-One Rank Test	10000	>10000			1		

· · · · · · · · · · · · · · · · · ·	7" "					1-					'
$_{s}$ $w_{t}$			N	laximun	n Likeliho						
Parameter .	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	iter
Slope	0.13558	0.16981	-0.1972 0.4684	-141	0	5.05549	9.48773	0.28	14.3072	7.37595	3
Intercept	3.06029	0.51952	2.04204 4.07854								_
TSCR	9 - 9 - 3			. :		1.0 -					
Point	Probits	mg/L	95% Fiducial Limits			0.9	<b>.</b>		•		
EC01	2.674	0.00141					•	``			
EC05	3.355	149.569		• •		0.8 -	- '	•			
EC10	3.718	71538.5		٠,٠٠,		0.7					
EC15	3.964	4597483		200		န္တီ 0.6 -	}		/	1	
EC20	4.158	1.3E+08	• •			<b>0.5</b>		' /	,		
EC25	4.326	2.1E+09	. 4	,		0.5 0.4	1		•		
EC40	4.747	2.7E+12	• • • • • • • • • • • • • • • • • • • •		,	0.3	1				
EC50	5.000	2E+14		-			ł				
EC60	5.253	1.5E+16	<b>)</b>			0.2	١.,			1	
EC75	5.674	1.9E+19	· ·			0.1 -	• • • • • • • • • • • • • • • • • • •		÷		
EC80	5.842	#######	<b>;</b>			0.0 -			, , , , , , , , , , , , , , , , , , ,		
EC85		######				0.0	001 10000	0 1E+11	1E+18 1E	+25 1E+32	
EC90	6,282										
EC95		######	i e				1	:			

EC99

7.326 ########

#### Appendix Table C-9c. Water Quality Summary for 96-hour Culex pipiens Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 15 April 2003

Concentration	Rep			umbe Orga		 8		Disso	olved C				(1	pH pH unl	ts)			nducti mhos-c	:m)			mpera (°C)			Percent Survival
(mg/L)	110,2	0	24	48	72	96	0	24	48		96	O.	24	48	72	96	0	48	98	0	24	48	72	96	Quiviva
	Α	5	5	5	5	4	9.3	5.8	7.0	5,6	6.2	7.90	7.73	7.72	7.53	7.46	169	174	184	20.0	20.5	20.6	20.6	20.7	80
	В	5	5	5	4	4								7		1									80
Lab Control	С	5	5	5	5	5														in the second					100
	D	5	5	4	4	3	- <del>-</del>	1													l				60
	Е	5	5	5	5	5																			100
	Α	5	5	5	5	5	9.2	5.9	7.1	5.6	6.0	7.87	7.77	7.75	7.52	7.47	175	180	189	19.9	20.6	20.5	20,5	20.7	100
	В	5	4	4	3	3			3					Harana Kabulan	u J									1	60
10	C	5	5	5	5	5			1		ir Ie														100
	D	5	5	5	5	4															il Il	ļ		1100	80
	E	5	5	5	3	3						(										10			60
_	A	5	5	5	5	5	9.3	5.5	7.0	5.2	5,8	7.79	7.73	7,77	7.51	7.50	199	203	211	19.9	20,6	20.5	20.0	20.8	100
	В	5	5	5	5	5																			100
100	o	5	5	5	5	5			1									!			i				100
	D	5	5	5	5	5																			100
	E	5	5	5	5	5					2							L					kaaro ilo		100
	Α	5	5	3	3	3	9.3	5.7	6.7	5.2	5.0	7.56	7.78	7.80	7.64	7.55	307	308	313	19.9	20.6	20.6	20.6	20.7	60
	В	5	5	5	5	5																	L		100
500	Ç	5	5	5	5	5												i							100
İ	D	5	5	5	5	5											14. k Linux				l La mila			ji	100
-	E	5	5	5	5	5													<u> </u>	ا ئىدىنىدىن					100
	Α	5	5	5	5	5	9.3	5.9	7,7	6.0	6.0	7.43	7.78	7.87	7.77	7.72	449	452	455	19.9	20.6	20.6	20.6	20.8	100
	В	5	5	5	5	5 -			f.									1017 - 15. 1 12. 12. 14. 14.							100
1,000	С	5	5	5	5	4								1											80
	D	5	5	5	5	5						1											b		100
į	Ε	5	5	.5	5	4								[											80
	Α	5	5	5	5	5	9.3	6,0	8.0	6.0	4.6	7.03	7.41	7.56	7.55	7.45	1501	1499	1487	19,7	20.7	20.6	20,6	20.9	100
	В	5	5	5	5	5													1					147.	100
5,000	C	5	5	5	5	5																			100
1	D	5	4	4	4	4																			80
Ì	E	5	5	5	5	5											2	-		02					100
<del></del> -	Α	5	5	5	5	5	9.5	6.2	7.3	4.9	4.5	6.83	7.16	7,25	7,27	7.23	2650	2640	2630	19.1	20.7	20.7	20.6	20.9	100
40.000	В	5	5	5	5	5						1													100
10,000	С	5	5	5	5	5											- 								100
	٥	5	5	5	5	5					. ;					ļ.,.,.,.								: ''' ' [   	100
•	E	5	5	5	5	5													غاد كنانا						100

			A	cute Mos	quito Larvae	Bioassay-96 Hr Survi	val
Start Date:	04/15/2003		Test ID:			Sample ID:	BEAZER
End Date: Sample Date:		ĺ	Lab ID: Protocol: /			Sample Type: Test Species:	OTH-Other sample type C P-Culex pipiens
Comments:	Chemical	testing - F	PSA Defin	ative			
Conc-mg/L	1	2	3	4	5		<u> </u>
L-Lab Control	0.8000	0.8000	1.0000	0.6000	1.0000	· · · · · · · · · · · · · · · · · · ·	
10	1.0000	0.6000	1.0000	0.8000	0.6000		
100	1.0000	1.0000	1.0000	1.0000	1.0000		
500	0.6000	1.0000	1.0000	1.0000	1.0000		
1000	1.0000	1.0000	0.8000	1.0000	0.8000		•
5000	1.0000	1.0000	1.0000	0.8000	1.0000		
10000	1.0000	1.0000	1.0000	1.0000	1.0000		
							•

			Tra	ansform:	Arcsin Sc	uare Roof	ì :	Rank	1-Tailed	 Isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	_ Sum	Critical	Mean	N-Mean
L-Lab Control	0.8400	1.0000	1.1582	0.8861	1.3453	16.679	5	-		 0.9200	1.0000
10	-0.8000	0.9524	1.1140	0.8861	1.3453	20.614	5	26.00	16.00	0.9200	1.0000
. 100	1.0000	1.1905	1.3453	1.3453	41.3453	0.000	5	35.00	16.00	0.9200	1.0000
500	0.9200	1.0952	1.2534	0.8861	1.3453	16.384	5	31.50	16.00	0.9200	1.0000
1000	0.9200	1.0952	1.2500	1.1071	1.3453	10.434	5	31.00	16.00	0.9200	1.0000
5000	0.9600	1.1429	1.2977	1.1071	1.3453	8.207	5	33.00	16.00	0.9200	1.0000
10000	1.0000	1.1905	1.3453	1.3453	1.3453	0.000	5	35.00	16.00	0.9200	1.0000

Auxillary Tests		•			Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	nal distribi	ution $(p > 0)$	0.01)		0.92257	0.91	-0.7501	0.64763
Equality of variance cannot be co	nfirmed		•			* - 4 *		• • • • • • •
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	٠.			
Steel's Many-One Rank Test	10000	>10000				<u> </u>		

		4	Line	ear Interpola	tion (200 Resamples)				
Point	mg/L	SD	95% CL(Exp)	Skew		,			
IC05	>10000							_	
IC10	>10000	* .		-				٠٠,	
IC15	>10000				1.0	<u> </u>			
IC20	>10000	•	. • •	•	0.9	•			
IC25	>10000								
IC40	>10000				0.8				
IC50	>10000				0.7	•			
	ra ·				0.6				
					<b>8</b> 0.5 <b>]</b>				-
*	T				8 0.5 0.4 0.3 0.3	•			
					<b>8</b> 0.3 €				
	•				& %3]		1		
			•		0.2	-			
			•		0.1 -				
					0.0	<del></del>			
					-0.1 -	•			
					-0.2				
					0 2000	4000 6000 80	00 10000		

Dose mg/L

Oncorhynchus mykiss

## Appendix Table C-10a. Water Quality Summary for 96-hour *Oncorhynchus mykiss*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 10 April 2003

Concentration				mbe					ived O (mg/L)	xygen				pH oH unit	s)	-		nducti nhos-c	-			mperat		sternoviči.	Percent Survival
(mg/L)	Rep			Orgai 48		96	0		48	72	96	6	24	48		96	Ç	48	96	O	24		72		
			10	10	10	10	9.4	6.0	9.1	8.9	9.8	8.00	7,42	7.76	7.81	7.84	202	191	204	11.3	13.8	13.6	13.5	13.4	100
	<u> </u>	10	10	10	10	10	3.7 (B)	0.0							GT TO S						انتا دنا				100
Lab Control	B	10		10	10	10			-		-:	[	7.												100
	<u>-</u>	10	10		10	10																			100
	D	10	10	10	10	10	9.4	5.7	8.7	8.3	9.1	8.04	7.48	7.70	7.72	7.80	211	198	211	11.4	13.7	13.5	13.5	13.4	100
	A_	10	10	10	10	10	5.7	0.7													1				100
10	B	10	10	10	10	10		L	Lu-	)															100
	<u></u>	10:	10	<del>                                     </del>	10	10	.1. +							ţ.									1		100
	P	10	<del></del>	10	10	10	9.4	5.3	8.5	8.4	9.4	8.05	7.48	7.69	7.73	7.88	266	249	259	12.0	13.8	13.5	13.5	13.3	100
	<u> </u>	10	10	10	10	10	5.4	3.3	0.0												120				100
100	8	10	10	10	—	10		ļ	-	 	<u> </u>		) 1		1										100
	<u> </u>	10	10		10	10						# 24		# = = = = = = = = = = = = = = = = = = =	1										100
	P-	10	10	+-	10	10	9.4	5.1	8.4	8.2	8.8	8.07	7.51	7.69	7.73	7.81	511	455	471	12.2	13.9	13.5	13.5	13.4	100
	<u> </u>	10	╆	10	10	10	9.4	0.1		\$100 mg	V V					TET VY	3								100
500	B	10	-	4	10	10		4		#	11	1		na lacarita ann		İ									100
	<u>c</u>	10	+	+	10	10	ļ.,															1			100
	<u> </u>	10	+		+-	10	9.3	5.5	7.7	7.3	7.7	8,13	7,48	7.67	7.67	7.72	824	724	737	12.6	13.9	13.6	13.5	13.4	
	<u> </u>	10	+	+	+	10	9.3	3.5																	100
1,000	В	10	+											. 1	41. (1-4.4)										100
	C	10	+		+	┿~		de la tra				1													100
	D	10	+	+	+	-	9.3	5.0	7.3	6.2	5.8	8.17	7.48	7.67	7.65	7,68	3050	2630	2650	12.6	13.9	13.6	13.5	13.5	100
<b>]</b>	A	10	+-	+	<del></del>	+	9.3	3.0	7.5	0.2													la la la la la la la la la la la la la l		100
5,000	<u>B</u>	10	+-	+-		+			i																100
, '	<u> </u>	10	_			<del>  -</del>	"		1 -	ir					\$	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		***							100
	P	10	+	+-	+-	+	9.5	5.0	8.6	8.3	8.7	8.14	7.49	7.79	7.75	7.82	5810	5030	5060	12.2	13.9	13,5	13.4	13.4	100
,	<u>A</u>	10	<del></del>	<del></del>		<del></del>	9.5	5.0	0.0	0.0												<u> </u>			100
10,000	В	10	+-	-		+						) 				The same						1			100
,	C	10	-	-		+														H.	The state of		E		100
	D	10	10	10	10	10	i			1	. 2		معيد عالم		- سسانه	. 1 .1									

⁻ test serated

				Acute Fish To	est-96	Hr Surv	ival	-		_
Start Date:	04/10/200	3	Test ID:	0304-133		Sample	D:	BEAZER	<u></u>	_
End Date:	04/14/2003	3	Lab ID:			Sample	Type:	OTH-Other sam	ple type	
Sample Date:			Protocol: 1	EPAA 91-EPA Acute		Test S	• •	OM-Oncorhynch		
Comments:	Chemical	testing -	BMDSA D	efinative						
Conc-mg/L	1	2	3	4	*1		,		<del> </del>	_
L-Lab Control	1.0000	1.0000	1.0000	1.0000						_
- 10	1.0000	1.0000	1.0000	1.0000		. •				
100	1.0000	1.0000	1.0000	1.0000				•		
500	1.0000	1.0000	1.0000	1.0000		2				
1000	1.0000	1.0000	1.0000	1.0000				•		
5000	1.0000	1.0000	1.0000	1.0000						
10000	1.0000	1.0000	1.0000	1.0000						
-										

		_	Tra	insform:	Arcsin Sq	uare Roof	t	Rank	1-Talled	-	Isoto	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical		Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	- 4			J.	1.0000	1.0000
.10	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	.18.00	10.00		1.0000	1.0000
100	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	. 4	18.00	10.00		1.0000	1.0000
500 -	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
1000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
5000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
10000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000

Auxiliary Tests	Statistic	Critical Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	14 7 9 14 - 1 <b>1</b> 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.896	
Equality of variance cannot be confirmed	and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s		* 1
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV	TÜ		
Steel's Many-One Rank Test 10000 >10000	20 kg		

	192		Lii		ation (200 R	esample	s)				•
Point	mg/L	- SD	95% CL(Exp)	Skew		12					
IC05	>10000	at e i			profession of						
IC10	>10000				Y				•	:	
IC15	>10000				4	1.0 —		<u> </u>	•		' ,
IC20	>10000				·	,		•	*		
IC25	>10000					0.9				ľ	
IC40	>10000			- 1		0.8					
IC50	>10000			\$		- 1				1	
				77	A S	0.7	-				
					9	0.6		5		ľ	
-	•				Ę	0.5		• • • • • • • • • • • • • • • • • • • •			
	*			•		֡֓֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓					

## Appendix Table C-10b. Water Quality Summary for 96-hour *Oncorhynchus mykiss*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 10 April 2003

Concentration	Rep			ımbei Orgai		2		Disso	lved C (mg/L)	xygen		_		pH pH.unit	ts)	-		nducti nhos-c	•		Те	mperat (°C)	ture	_	Percent Survival
(mg/L)	Keh	ō	24	48	72	96	G.	24			96	0			72	96	0	48	96	O	24			96	<u> </u>
	Α	10	10		10	10	9.4	5.5	9.2	9.0	9.4	8.12	7.44	7.63	7.84	7.86	202	189	216	12.8	14.3	13.9	13.2	13.4	100
_	В	10	10	10	10	10				1 V							Ì				ļ				100
Lab Control	С	10	10	10	10	10											L.							Ŷ.	100
	Б	10	10	10	10	10			. =											ا د دستان در					100
	Ā	10	10	10	10	10	9.3	5,3	8.6	6.8	8.8	8.14	7.44	7.61	7.63	7.77	208	198	213	12.0	14.2	13,2	13.0	12.9	100
	В	10	10	10	10	10											( ). ( ).								100
10 `	С	10	10	10	10	10	<u> </u>						Andrews												100
	D	10	10	10	10	10		!							,					2					100
	Α	10	10	10	10	10	9.3	4.6	8.9	8.7	9.6	8.14	7.44	7.64	7.89	7,91	245	231	250	12.2	14.2	13.1	12.9	12.9	100
	В	10	10	10	10	10.					***														100
100	C	10	10	10	10	10					) 	!! !! !!										ing the second			100
	D	10	10	10	10	10																المعمر مدارأ			100
	Α	10	10	10	10	10	9.3	5.0	9.4	9.0	9.9	8.15	7.47	7.76	7.98	8.02	414	379	398	12.5	14.1	13.0	12.8	12.7	100
	В	10	10	10	10	10	in n			il				) 							í. 	1			100
500	С	10	10	10	10	10								j.					, .						100
	D	10	10	10	10	10							alian												100
	Α	10	10	10	10	10	9.3	4.8	9.7	9.3	10.0	8.14	7.47	7.89	8.07	8.11	615	545	564	12.0	14.1	13.0	12.7	12.8	100
4.000	В	10	10	10	10	10							j		) L				;	: ::::				i	100
1,000	С	10	10	10	10	10								) 						Ĺ					100
	Ď	10	10	10	10	10		ii.						ا - حماسيط	il Au, au	مكنده ديستان				language.			SALE.	i in in	100
	Α	10	10	10	10	10	9.3	4.7	9.1	5.8	5.7	8.15	7.48	7.80	7.61	7.60	2140	1844	1878	12.0	14.0	12.9	12.8	12.7	100
E 000	В	10	10	10	10	10							lineare e		1						-			7.7	100
5,000	C	10	10	10	10	10				-	i									.,					100
	D	10	10	10	10	10																	10.5	10.5	100
	Α	10	10	10	10	10	9.4	4.4	7.5	8.4	8.8	8.11	7.46	7.64			4080		3600	11.7	13.8	13.0	12.9	12.9	100
40.000	В	10	10	10	10	10								ir Om jega								L			100
10,000	C	10	10	10	10	10													٠						100
	D	10	10	10	10	10		: 			i.	8		3	) H			ا دارو راه			ا الداد . حامد				100

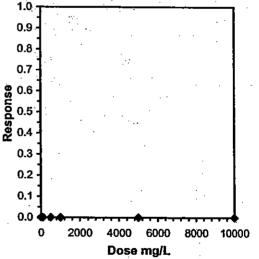
⁻ test senated

				Acute Fish Tes	t-96 Hr Survival	···
	04/10/2003 04/14/2003		Test ID: ( Lab ID:	0304-134	Sample ID: Sample Type:	BEAZER OTH-Other sample type
Sample Date:	Ob	4		EPAA 91-EPA Acute	Test Species:	OM-Oncorhynchus mykiss
Comments:	Chemical	testing -	BMSA Def	native		
Conc-mg/L	1	2	<u>3</u>	4	****	
L-Lab Control	1.0000	1.0000	1.0000	1.0000	<del></del>	
10	1.0000	1.0000	1.0000	1.0000	т.	
100	1.0000	1.0000	1.0000	1.0000		•.
500	1.0000	1.0000	1.0000	1.0000		
1000	1.0000	1.0000	1.0000	1.0000		
50 <b>00</b>	1.0000	1.0000	1.0000	1.0000		
10000	1.0000	1.0000	1.0000	1.0000		

1.443		_	Tra	ansform: .	Arcsin Sc	uare Root	1	Rank	1-Tailed		Isot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical		Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	. 4	14			1.0000	1.0000
10 -	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	•	1.0000	1.0000
100	1.0000	1.0000	1.4120	-1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
500	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	7 .	1.0000	1.0000
1000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	•	1.0000	1.0000
5000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
10000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00		1.0000	1.0000
	•			1	1.							

Auxillary Tests	Statistic Critical Skew Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1 0.896
Equality of variance cannot be confirmed	
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV	TU
Steel's Many-One Rank Test 10000 >10000	

Point		en	Lin		lation (200 F	Resamples)		·.
IC05	mg/L	SD	95% CL(Exp)	Skew	<del> </del>	<u> </u>		
	>10000	, e de la compansión de la compansión de la compansión de la compansión de la compansión de la compansión de la			* *		•	,
IC10	>10000		*					:
IC15	>10000	•			:	1.0	<u></u>	-1 ·
IC20	>10000			**	e de E			$\Box$
IC25	>10000		t -	•		0.9	•	
IC40	>10000			•		0.8	-	
IC50	>10000	radio.			. %.	₹.:		
		1		``		0.7		
			· · · · · · · · · · · · · · · · · · ·	A -: A		<b>9</b> 06		·   -
						95 0.6 - 0.5 -		
					·	0.4		
•						₩ 0.4 <del>1</del>	•	



## Appendix Table C-10c. Water Quality Summary for 96-hour *Oncorhynchus mykiss*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 10 April 2003

Concentration	i _			ımbei				Disso	lved O (mg/L)			İ	(	pH pH unit	rs)			nducti mhos-c			Te	mperat (°C)	ure		Percent Survival
(mg/L)	Rep			Orga			O	24		72	96	0	24			96	Q	48	96	Ö	24	48	72		
	A	10	10	10	10	10	9.4	5.9	8.2	7.9	8.4	8.06	7.67	7.59	7.54	7.53	201	192	222	11.6	14.2	13.2	13.1	13.1	100
	В	10	10	10	10	10	i de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la consta											il					المناسبة والمسا		100
	<del>-</del>	10	10	10	10	10																1			100
	<u> </u>	10	10	10	10	10		li meneritari Li										<u></u>		ده قات رانا	12.2.12				100
	A	10	10	10	10	10	9.3	5.8	8.4	8.1	8.8	8.02	7.64	7.62	7.65	7.66	206	196	208	11.8	14.0	13.1	13.0	13.1	100
	В	10	10	10	10	10		7.77			2.5											ر د رجانیا		Jena an	100
10	<del>-</del>	10	10	10	10	10										11			ا ينسانيا						100
·	<u> </u>	10	10	10	10	10		de estata E	to energian t fo la																100
	A	10	10	10	10	10	9.3	5.6	8.9	8.9	9.5	7.88	7.61	7.78	7.85	7.85	234	221	237	12.3	14.1	13.0	12.9	13.0	100
	В	10	10	10	10	10																	i die o		100
100	c	10	10	10	10	10					1									ا ، ، فِيْرِ					100
	<u> </u>	10	10	10	10	10										in property and		- 1 - 1				كظيلة			100
	Α	10	10	10	10	10	9.1	5.0	9.0	8.7	9.3	7.62	7.52	7.77	7:80	7.83	358	325	337	12.2	14.0	13.0	13.0	13.0	100
	В	10	10	10	10	10				ļ.		ļ	alan ee		ir Luces	ا مستند ول	:  		4 					2.0	100
500	С	10	10	10	10	10											1	19 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					دواراداد		100
	D	10	10	10	10	10		1		j 		si:	يد المستدر			ة ( الرابع ) . <u>ما تست المحالة</u>							40.0	400	100
	Α	10	10	6	6	6	9.2	5.3	9.2	8.9	9.8	7.48	7.49	7.82	7:85	7.99	514	493	514	12.3	14.0	13.1	13.0	13.0	
	В	10	10	10	10	10											·							í	100
1,000	c	10	10	10	10	10							ا ماندان الم				} }			lan,			22	<u>-</u> 13-13	100
		10	10	10	10	10				i.		1	عاريب المراجع	ļ <u></u>	<u> </u>	i calaba	<u> </u>	<u> </u>	<u></u>				40.0	40.0	100 100
	A	10	10	10	10	10	9.3	5.5	9.0	8.7	9.5	7,12	7.33	7.53	7.57	7.67	1717	1501	1522	12.0	14.0	13.1	12.9	13.0	100
# 000	В	10	10	10	10	10					4				1							4		ملاء دا در ا	0
5,000	c	10	0	0	0	0															i i				100
	Б	10	10	10	10	10	, <u>.</u>			ا ماليان	ļ.	1			سندرا فأ	. Lakelin		<u></u>	0000	40.0	44.0	42.4	13.1	13.0	100
·	A	10	10	10	10	10	9.6	4.5	8.4	7.5	8.9	6.88	7.15	7.32	7.32	7.47	3160	2760	2800	12.0	14.0	13.1	13.1	13.0	100
40.000	В	10	10	10	10	10					1						ļi	1			بيديد		2		100
10,000	С	10	10	10	10	10									1					- :::::	e a percent	Territ			100
	D	10	10	10	10	10		.: .:	فوالشيد أأف	ii Magazi	ا عسيران	1	1			1	1) 	An seem	1	ll a section	بلايد بسائد	diam'r.		hina in.	100

[.] lest gerated

		_		Acu	ite Fish Test	-96 Hr Survival	<del></del>
Start Date:	04/10/2003	3	Test ID:			Sample ID:	BEAZER
End Date: (	04/14/2003	3	Lab ID:			Sample Type:	OTH-Other sample type
Sample Date:			Protocol: I	EPAA 91-EI	PA Acute	Test Species:	OM-Oncorhynchus mykiss
Comments:	Chemical	testing -	PSA Defin	ative		•	-  -  -
Conc-mg/L	<u>, 1</u>	2	3	4			
L-Lab Control	1.0000	1.0000	1.0000	1.0000			
10	1.0000	1.0000	1.0000	1.0000	-		
100	1.0000	1.0000	1.0000	1.0000			
500	1.0000	1.0000	1.0000	1.0000		•	
1000	0.6000	1.0000	1.0000	1.0000			
5000 /	1.0000	1.0000	0.0000	1.0000	÷		
10000	1.0000	1.0000	1.0000	1.0000	4 May 1		

		_	Tr	ansform:	Arcsin Sc	uare Root	ł .	Rank	1-Tailed	Number	Total
Conc-mg/L	<u>Mean</u>	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4			0	40
10 -	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	. 4	18.00	10.00	Ō	40
100	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	. 0	40
500	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	Ö	40
1000	0.9000	0.9000	1.2805	0.8861	1.4120	20.536	4	16.00	10.00	4	40
5000	0.7500	0.7500	1.0987	0.1588	1.4120	57.032	. 4	16.00	10.00	10	40
10000	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	. 4	18.00	10.00	0	40

Auxillary Tests		) . <u></u>			Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-n	ormal dis	stribution (	p <= 0.01)	7.6%	0.59321	0.896	-2.7202	11.3006
Equality of variance cannot be confi	rmed.		<u>.</u>		10 May 1			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤU				
Steel's Many-One Rank Test	10000	>10000			Cept of C			

<u>:</u>												
	- 1,	•		M	aximun	n Likeliho	od-Probl	<u> </u>				
Parameter	Value	SE	95% Fidu	cial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	iter
Slope	0.5833	0.44576	-0.6543	1.82094		0	19.3443			5.82461	1.71437	5
Intercept	1.60248	1.53538	-2.6604	5.86538	: .		1					•
TSCR		:					1.0		100			
Point	Probits	mg/L	95% Fldu	cial Limits	•				•			
EC01	2.674					•	0.9					
EC05	3.355	1010.94	•			` v.	0.8	. ,			-[	
EC10	3.718			-			0.7	l-' '		/ /	ŀ	
EC15	3.964	11163	;	7.4		•	ගී 0.6 -		*	/	ļ	
EC20	4.158	24085.9							•	• /		
EC25	4.326			* :	×.		0.5 0.4	ļ.		/		
EC40	4.747				•	111	ĕ 0.4 ·		/	/		
EC50	5.000				×		0.3	ľ	/	•		
EC60		1815285					0.2 -	1	<b>+</b> /			
EC75		9570610						ł	. /		. '	
EC80		1.9E+07			•	•	0.1	] _	<b>"</b>			
EC85	6.036		•			. ,	0.0 -		• • • • • • • • • • • • • • • • • • •	Ord of Particular	1 1 1 1 1 1 1	
EC90		1.1E+08						1 100	. 10000 1	E+06 ,1E+	08· 1E+10	

EC95 6.645 4.4E+08 EC99 7.326 6.5E+09 Significant heterogeneity detected (p = 6.72E-04)

Lepomis macrochirus

## Appendix Table C-11a. Water Quality Summary for 96-hour *Lepomis macrochirus*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 30 April 2003

Concentration	Rep			ımbei Orgai				Disso	ived O (mg/L)				(r	pH oH unit	s)			nduction	•		Ter	mperat (°C)	ure		Percent Survival
(mg/L)	Iveb	O	to the same of	48	D-CHCHCHCH	96	0	24ª	48	72	96	0	24	48	72	96	O	48	96	0	24	48		96	
	Α	5	5	5	5	5	7.7	2.2	8.5	6.6	6.6	7.92	7.40	7.93	7.94	7.90	763	771	793	21.0	20.6	20.4	20.3	20.4	100
Lab Control	В	5	5	5	5	5											200		ر د شور در ا		1 (1995) Laute				100
	С	5	5	5	5	5																			100
	A	5	5	5	5	5	7.7	1.0	9.4	7.9	7.7	7.90	7.36	8.07	8.09	8.14	767	775	792	21.0	20.6	20.3	20.3	20.1	100
. 10	В	5	5	5	5	5									7.4										100
, ,	c	5	5	5	5	5																			100
	A	5	5	5	5	5	7.7	1.1	7.0	6.5	6.8	7.90	7.38	7.81	7.85	7.91	820	831	858	21.0	20.5	20.4	20.5	20.3	100
100	B	5	5	5	5	5			0.0000000	7.00	The Transition	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1					ne secti								100
	C	5	5	5	5	5																			100
<del></del>	A	5	5	5	5	5	7.7	1.4	9,4	7.7	7.6	7.90	7.40	8.09	8.08	8.13	1040	1046	1063	21.0	20.4	20.4	20.4	20.3	100
500	В	5	5	5	5	5																			100
000	C	5	5	5	5	5						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1													100
	A	5	5	5	5	5	7.8	1.3	8.3	6.7	6.6	7.91	7.42	7.94	7.87	7.87	1304	1313	1331	21.0	20.6	20.5	20,4	20.3	100
1,000	B	5	5	5	5	5					13 1477		, ·					11.1							100
1,000	C	5	5	5	5	5						L			Link #								100		100
	A	5	5	5	5	5	7.8	1.2	8.3	7.2	6.4	7.89	7.47	8.00	7.92	7.90	3230	3250	3290	20.9	20.6	20.4	20.4	20.3	100
5,000	B	5	5	5	5	5																			100
5,000	C	5	5	5	5	5						Section 1						de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la			65.				100
<del> </del>	<del>                                     </del>	5	5 5	5	5	5	7.8	1.9	1.8	4.6	6.7	7.89	7.40	7.69	7.68	7.93	5650	5650	5710	20.8	20.6	20.5	20.5	20.1	100
10,000	В	5	5	5	5	5	7.5	1.5			-														100
10,000			5		5	5	2.4.4.					Li				<u>_</u>									100
	С	5	ີ	5	ਹ	<u>. ۷</u>		il., 2.14.	ملة فللما للما	فكوة الشداعاة	عدست تشاعل	لمريد سأمسط		L	فهانستاه د د	Luciación	المنافسة ويدبيا وأر	er - Metalone		استخدت السا	المناه والمناط		and the same	STATE OF THE PARTY.	

⁻ test aerated

•		_	Acute Fi	sh Test-96 Hr Survival	
Start Date:	04/30/2003	Te	est ID: 0304-205	Sample ID:	BEAZER
End Date:	05/04/2003	La	b ID:	Sample Type:	OTH-Other sample type
Sample Date:		Pn	otocol: ASTM E1241	Test Species:	LM-Lepomis macrochirus
Comments:	Chemical 1	testing - BM	IDSA Definative	•	·
Conc-mg/L	1.	2		+ 14	
L-Lab Control	1.0000	1.0000			
10	1.0000	1.0000			
100	1.0000	1.0000			
500	1.0000	1.0000			
1000	1.0000	1.0000			
5000	1.0000	1.0000			
10000	1.0000	1.0000		•	

<del></del>			Tra	ansform:	Arcsin Sc	uare Root					
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N		Mean	N-Mean	
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000	
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	_	1.0000	1.0000	
. 100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	,	1.0000	1.0000	
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000	
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000	
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000	
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000	

Auxiliary Tests Statistic Critical Skew Kurt

Normality of the data set cannot be confirmed

Equality of variance cannot be confirmed

	• .			ear Interpolation	n (200 Resamples)	)	1	
Point	mg/L	SD	95% CL(Exp)	Skew				
IC05	>10000							-
IC10	>10000		•					
IC15	>10000				1.0	<u>.</u>		4.0
IC20	>10000			5	201			
IC25	>10000				0.9		4	
IC40	>10000				0.8 -			
1C50	>10000				0.7			
					_			٠,
					<b>%</b> 0.6 <b>-</b>			
					Response			
					S			
		•	•	-	ر ^{0.4} ا	•		\$ -
•			•		0.3 -	٠,		•
		•		_	0.2	,		
				•	U.Z 7			

0.1

0

2000

4000 6000

Dose mg/L

8000 10000

# Appendix Table C-11b. Water Quality Summary for 96-hour *Lepomis macrochirus*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 30 April 2003

Concentration				ımbei Orgai				Disso	lved O (mg/L)				(r	pH oH unit	s)			nducti	-		Te	mperat (°C)	ure		Percent Survival
(mg/L)	Rep			48	DOM:NO.		0	24 ²	48	72	96	O.	24	48	72	96	Q	48	96	0	24	48	72	96	
	A	5	5	5	5	5	7.8	5.3	6.8	6.1	6.6	7.85	7.61	7.71	7.79	8.00	760	771	792	20.7	20.7	20.6	20.6	19.9	100
Lab Control	В	5	5	5	5	5	<b>*</b> 1000		1570, U.S. N. 144	SYA.										3					100
	c	5	5	5	5	5													li mine m	b-vii-		الشياشية			100
	A	5	5	5	5	5	7.7	5.5	6.0	5.8	5.0	7.84	7.62	7.69	7.74	7.75	771	784	800	20.7	20.7	20.6	20.6	20.4	100
10	В	5	5	5	5	5								C vint your											100
	c	5	5	5	5	5															س نے				100
	A	5	5	5	5	5	7.7	5.8	6.2	5.7	4.3	7.86	7.66	7.72	7.74	7.73	804	814	824	20.7	20.7	20.6	20.6	20.3	100
100	В	5	5	5	5	5					17 TGA 5											12.2	2.2.2	4	100
	c	5	5	5	5	5															9				100
	A	- 5	5	5	5	5	7.7	5.6	5.1	4.6	4.5	7.85	7.69	7.64	7.65	7.70	943	950	966	20.7	20.6	20.5	20,6	20.3	100
500	В	5	5	5	5	5		1.5												l V	L Mels				100
	C	5	5	5	5	5																			100
<del> </del>	A	5	5	5	5	5	7.7	6.0	5.0	4.9	4.9	7.85	7.74	7.61	7.66	7.71	1152	1164	1186	20.7	20.5	20.5	20:6	20.3	100
1,000	В	5	5	5	5	5													i		7				100
.,	c	5	5	5	5	5																			100
<del></del>	A	5	5	5	5	5	7.7	6.0	5.4	5.1	4.5	7.83	7.79	7.67	7.70	7.67	2570	2590	2600	20.6	20.6	20.5	20.6	20.4	100
5,000	В	5	5	5	5	5																1			100
-1	c	5	5	5	5	5												iL							100
<del> </del>	Ā	5	5	5	5	5	7.7	6.4	6.7	6.0	6.0	7.81	7.83	7.78	7.77	7.87	4330	4270	4320	20.5	20.6	20.5	20.5	20.1	100
10,000	В	5	5	5	5	5			T-1																100
19,000	c	5	5	5	5	5		,																	100

^{* -} test aerated

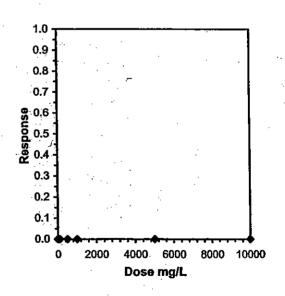
	_		Acute Fish	Test-96 Hr Survival	
Start Date:	04/30/2003	3	Test ID: 0304-206	Sample ID:	BEAZER
End Date: (	05/04/2003	3	Lab ID:	Sample Type:	OTH-Other sample type
Sample Date:		•	Protocol: ASTM E1241	Test Species:	LM-Lepomis macrochirus
-	Chemical 1	testing -	BMSA Definative	•	·
Conc-mg/L	1	2			
L-Lab Control	1.0000	1.0000	· · · - · - · · · · · · · · · · · · · ·	• •	
10	1.0000	1.0000	)		
100	1.0000	1.0000	) [*]		
500	1.0000	1.0000	)		
1000	1.0000	1.0000	)	-	
5000	1.0000	1.0000	·		
10000	1.0000	1.0000	)	•	

	•	· _	Jra	ansform: .	Arcsin Sc	uare Root			Isote	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	•	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
100	1.0000	1.0000	1.3453	1.3453	1,3453	0.000	2		1.0000	1.0000
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	•	1.0000	1.0000
5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	1.0000
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	<b>2</b> .;		1.0000	1.0000

Auxiliary Tests Statistic Critical Skew Kurt
Normality of the data set cannot be confirmed

Equality of variance cannot be confirmed

			Line	ear Interpolation	(200 Resamples)
Point	mg/L	SD	95% CL(Exp)	Skew	
IC05	>10000				
IC10	>10000			i e	
IC15	>10000		•		1.0
IC20	>10000				
IC25	>10000				0.9
IC40	>10000				0.8
IC50	>10000				0.7
			<u> </u>		



# Appendix Table C-11c. Water Quality Summary for 96-hour *Lepomis macrochirus*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 30 April 2003

·	<del>- :</del>		Nu	ımbei	of					xygen				pH	-\			induction	-		Ter	nperat	ure		Percent Survival
Concentration	Rep			Orgai		3	am nanatan		(mg/L		1848888			H unit	s)   72	96	0	48	ODDOGEN	ō	24	48	72	96	Sulviva
(mg/L)	,	0	24	48	72	96	0	24 ^a	48	72	96	9	24	48	10,000,000	7.90	763	771	793	21.0	20.6	20.4	20.3	20.4	100
	Α	5	5	5	5	5	7.7	2.2	8.5	6.6	6.6	7.92	7.40	7.93	7.94	7.90	703								100
	В	5	5	5	5	5							<u></u>			}		11 11							100
	С	5	5	5_	5	5								7.00	7.00	7.00	779	789	802	21,0	20.6	20.3	20.3	20.4	100
	Α	5	5	5	5	5	9.1	1.6	9.2	7.8	8.0	8.41	7.60	7.89	7.99	7.99	119	703	002					e i c	100
10	В	5	5	5	5_	5															1,=1,1k=1.		100		100
	С	5	5	5	5	5									7.70	7.00	905	818	826	21.0	20.5	20.2	20.2	20.4	100
	Α	5	5	5	5	5	9.1	2.7	6.8	6.1	6.3	8.19	7.54	7.82	7.79	7.92	805	010	020						100
100	В	5	5	5	5	5_		- د د د د نیا				<u>                                     </u>						4							100
	С	5	5	5	5	5							1 20 00		7.00	7.04	920	930	966	20.9	20.5	20.2	20.2	20.4	100
	Α	5	5	5	5	5	9.2	1.9	7.0	6.1	6.0	7.81	7.56	7.81	7.86	7.94	920	930	300	20.0					100
500	В	5	5	5	5	5						ļ. —	 	1											100
	С	5	5	5	5	5	المناسبة الما								7.04	7.95	1059	1068	1092	20.9	20.5	20.2	20.2	20.4	100
	Α	5	5	5	5	5	9.2	3.6	8.3	7.2	6.6	7.61	7.60	7.90	7.91	7.95	103	1000	2 7 6 7 7						100
1,000	В	5	5	5	5	5		يرين	 																100
	С	5	5	5	5	5									7.05	7.60	2420	2140	2170	20.8	20.6	20.2	20.2	PINE PROPERTY.	*
	Α	5	5	5	5	5	9.1	3.0	7.6	6.4	6.6	7.14	7.42	7.66	7.65	7.68	213	7 2 140		20.0					100
5,000	В	5	5	5	5	5								1				عبد د ا						2,23,24	100
	С	5	5	5	5	5		1							7.40	7.52	3320	3340	3390	20.4	20.5	20.2	20.2	20.1	100
	A	5	5	5	5	5	9.2	3.2	8.6	6.9	6.7	6.93	7.40	7.50	7.48	1.52	332	3040	, 3030						100
10,000	В	5	5	5	5	5								1				ــــــــــــــــــــــــــــــــــــــ							100
	С	5	5	5	5	5		نـــــال					1	بلت دريا أن		دحدث أأن	حدث الأد	ــــــاك	تحديان		Application		and the state of the state of	ien i ettien kennit	<u></u>

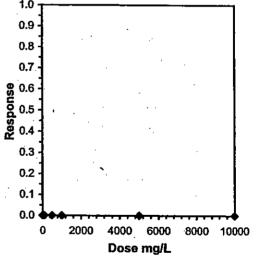
⁻ test aerated

			Acute Fis	sh Test-96 Hr Survival	
Start Date:	04/30/200	3 .	Test ID: 0304-207	Sample ID:	BEAZER
End Date:	05/04/200	3	Lab ID:	Sample Type:	OTH-Other sample type
Sample Date:			Protocol: ASTM E1241	Test Species:	LM-Lepomis macrochirus
Comments:	Chemical	testing -	- PSA Definative		
Conc-mg/L	1	2			
L-Lab Control	1.0000	1.0000	)		
10	1.0000	1.0000	)		•
100	1.0000	1.0000	)		
500	1.0000	1.0000	)		
1000	1.0000	1.0000	)		
5000	1.0000	1.0000	)		•
10000	1.0000	1.0000	)		

		,-	Tra	ansform:	Arcsin Sc	uare Roof	:		lsot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	•	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	
10	1.0000	1,0000	1.3453	1.3453	1.3453	0.000	2	**	1.0000	
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	
500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	
1000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	_ <b>2</b>	· · · · · · · · · · · · · · · · · · ·	1.0000	
5000	1.0000	1.0000	1.3453	1.3453	1:3453	0.000	2		1.0000	
10000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2		1.0000	-,

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

			Line	ear Interpo	lation (20	00 Resample	s)			<del></del> ,
Point	mg/L	SD	95% CL(Exp)	Skew				•		
1C05	>10000									
IC10	>10000			1						
IC15	>10000			•		1.0 -				
IC20	>10000					4				
IC25	>10000				٠,	0.9			ļ.	
IC40	>10000			:		0.8		."		•
IC50	>10000		1 2			<u>, - 1</u>				
					•	0.7				,
			•			<b>%</b> 0.6 -		=		
		-	:			ซึ _{กร} ์ไ				•



Brachionus calyciflorus

Acute Exposure

### Appendix Table C-12a. Water Quality Summary for 24-hour *Brachionus calyciflorus*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 11 April 2003

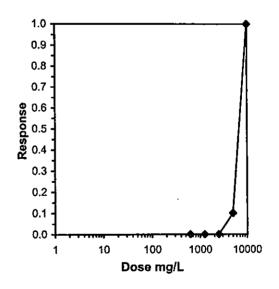
Concentration (mg/L)	Rep		r of Live nisms	•	O g/L)		H units)	Co (mmh	nd. os/cm)		erature C)	Percent
(ilig/L)		. 0	. 24	Ö	24	0	24	0	24	0	24	Survival
	Α	5	_ 5	7.8	7.6	7.99	8.06	306	311	25.6	25.0	100
	В	5	5		7 / E			J. 148. 3	JAZZA.		120.00	100
	С	5	5									100
Control	_ D	5	5								-	100
Control	Е	5	5									100
	F	5	5				1.0					100
	G	5	5									100
	Н	5	5									100
	Α	5	5	7.4	7.2	7.93	8.00	718	721	25.8	25.0	100
	В	5	5						A 44		( ) ( ) ( ) ( ) ( ) ( )	100
	C	5	5									100
625	D	5	5									100
	E	5	5									100
	F	5	5									100
	G	5	5									100
	н	5	5									100
	A	5	5	7.6	7.6	7.91	7.97	1114	1121	25.9	25.1	100
	В	5	5	2.55								100
	С	5	5					1				100
1,250	D	5	5									100
,	E	. 5	5									100
	F	5	5									100
	G	5	5									100
_	H	5	5									100
	A	5	5	7.7	7.5	7.96	7.97	1823	1830	24.9	25.1	100
	В	5	5									100
	١	5	5	::::::::::::::::::::::::::::::::::::::								100
2,500	D	5	5									100
	E	5	5	1								100
	F	5	5									100
	G H	5	5									100
	_	5	5		ميدو	7.00						100
	A B	5 5	4	7.4	7.5	7.98	7.98	3240	3260	25.7	25.0	80
	C	5	5							N		80
	片	5	5	)				F:		=====	4	100
5,000	늗	5	4									100
	F	5	5					ŗ.				80
	G	5	5		- 12			-				100
	버	5	4	, ————————————————————————————————————								100
	A	5	0	7.4	7.3	7.98	7.98	5870	5890		25.0	80
	B	5	0			7.30	1.30	30/0	2090	25.2	25.0	0
	c	5	0								p===	0
	D	5	0							######################################		
10,000	E	5	0									0
	F	5	- 0			<u>ي</u> دمد						
•	G	5	0				الجديدين المدينية		700			0
ĺ	H	5	- 0									- 0
MEC Bioassay Labora				Con Dings	C4 02424	المستشيب						0

		· · · · · · · · · · · · · · · · · · ·					est-24 Hr	Survival		
Start Dat		4/11/03	•	Test ID:	0304-18N	N		Sample ID	<u> </u>	Beazer
End Date	:	4/12/03		Lab ID:	WAAEE-A	MEC NW	Bioassav	Sample Tv	/oe:	BMDSA-benzene metadisulfonic acid
Sample [	Date:	4/11/03		Protocol:	ASTM E14	40	•	Test Spec		BC-Brachionus calyciflorus
Commen	ts:									20 Diagnonas caryantoras
Conc-n	ıg/L	1	2	3	4	5	6	7	. 8.	<del></del>
D-Co	ntrol	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	625	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	1250	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	2500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	5000	0.8000	0.8000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	
1	0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

•			_	Tra	ansform:	Arcsin Sc	uare Roof	t	Rank	1-Tailed	Number	Total
a .	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
	D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
١.	625	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	0	40
	1250	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	0	40
ğ	2500	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	0	40
	5000	0.9000	0.9000	1.2262	1.1071	1.3453	10.381	8	52.00	46.00	4	40
1.	*10000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8	36.00	46.00	40	40

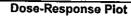
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	-normal dis	stribution	(p <= 0.01)		0.57448	0.929	1.5E-14	3.47391
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TÜ			•	
Steel's Many-One Rank Test	5000	10000	7071.07					

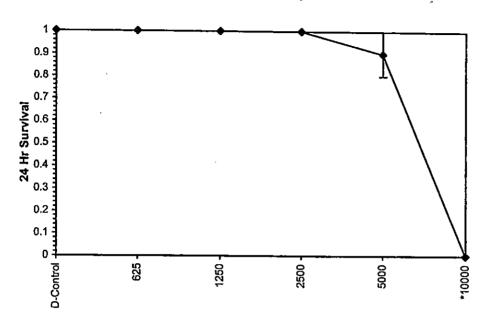
-				···· · · ·	Trimmed Spearman-Karber
•	Trim Level	EC50	95%	CL	•
	0.0%	6597.54	6177.66	7045.96	
	5.0%	6745.97	6214.35	7323.08	
	10.0%	6803.95	6533.3	7085.81	1.0 —
	20.0%	6803.95	6533.3	7085.81	0.9
-	Auto-0.0%	6597.54	6177.66	7045.96	



Start Date: 4/11/03 Test ID: 0304-18NW Sample ID: Beazer
End Date: 4/12/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: BMDSA-benzene metadisulfonic acid BC-Brachionus calyciflorus

Comments:





### Appendix Table C-12b. Water Quality Summary for 24-hour *Brachionus calyciflorus*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 11 April 2003

Concentration (mg/L)	Rep		r of Live nisms	•	)O g/L)		H units)	,	nd. os/cm)		erature C)	Percent
···ə/ -/	<u> </u>	0	24	0	24	0	24	0	24	0	24	Surviva
	Α	5	_ 5	7.8	7.5	7.99	8.06	306	311	25.6	25.2	100
	В	5	5			<b>建数数</b>						100
	С	5	5									100
Control	D	5	5									100
	E	5	5_									100
	F	5	5									100
	G	5	5	Y						E.7.7		100
	Н	5	5									100
	Α	5	5	7.5	7.5	7.94	7.99	586	590	25.0	25.0	100
	В	5	5									100
	C	5	5				<i></i>					100
625	D	5	5	2.1								100
	E	5	5									100
	F	5	5									100
	G	5	5									100
	Н	5	5	Second St.								100
	Α	5	5	7.3	7.2	7.91	7.99	862	872	25.1	25.1	100
	В	5	5									100
	C	5	5									100
1,250	D	5	5					1				100
	E	5	5						1.00			100
	F	5	5									100
	G	5	5				=======					100
	н	5	5			كديب				/ <u>2</u>		100
	A	5	5	7.7	7.4	7.99	7.98	1365	1375	25.4	25.1	100
	В	5	5									100
	읮	5	5								::=:::::::::	80
2,500	무	<u>5</u>									: :=:::-:::::::::::::::::::::::::::::::	100
	E F	. 5	<u>5</u>									100
	-			-	3							100
	G H	<u>5</u>	<u>5</u> 5									100
<del></del>	Ā	5	5	7.0		7.00	0.00	0050				100
	B	5	5	7.8	7.4	7.98	8.00	2350	2360	25.4	25.0	100
		5	5									100
	6	5	5									100
5,000	F	5	5							F		100
	F	5	5					=======================================				100
	G	5	5									100
	吊	5	5									100
	Ä	5	- 0	7.3	7.1	7.98	8.00	4230	4300	25.6	25.4	100
	B	5	0		, .	1.50	0.00	4230	4300	25.6	25.1	0
	c	5	0									0
	Ы	5	0									0
10,000	E	5	- 0				FF 8:===					0
	F	5	0									0
	G	5	0							7.7		
	Н	5	_ 0									0
MEC Bioassay Labora				San Diego	CA 02121	الأنموسية		أنتنا للاستكنت	Y 7			_ 0

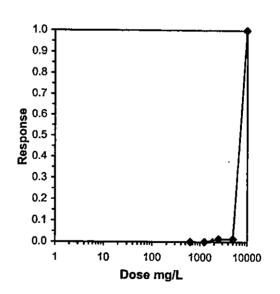
Start Date:		4144100	<u> </u>			Rotifer T	est-24 Hr	Survival		
End Date: Sample Da Comments:	te:	4/11/03 4/12/03 4/11/03		Lab ID:	0304-20N WAAEE-A ASTM E14	W MEC NW		Sample IF	/pe:	Beazer BMSA-benzene monosulfonic acid BC-Brachionus calyciflorus
Conc-mg/		1	2	3	4	5	6	7	8	
D-Cont		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	<del></del>
6	25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
12	50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
25	00	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	
50	00	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
100	00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

					ansform:	Arcsin Sc	uare Root	t	Rank	1-Tailed	Number	Total
F -	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
	D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			nesp	
L	625	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	0	40
	1250	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00		40
`	2500	0.9750	0.9750	1.3155	1.1071	1.3453	6.400	8	64.00	46.00	0	40
	5000	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	'	40
L	*10000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8	36.00	46.00	0	40
					0.2200	U.E.200	0.000	U	30.00	40.00	40	40

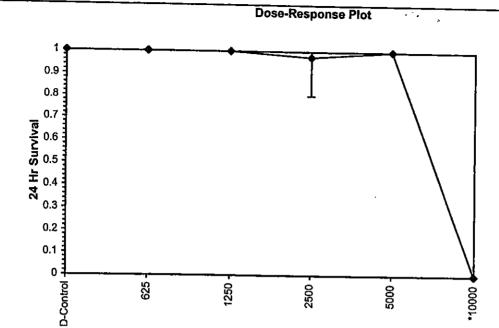
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	-normal dis	stribution	(p <= 0.01)		0.32014	0.929		37.8043
Equality of variance cannot be co	nfirmed						5 551	01.0040
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤU				
Steel's Many-One Rank Test	5000	10000	7071.07			<del></del>		

Trimmed Spearman-Karber

 Trim Level	EC50	95%	CL	
0.0%	6949.59	6714.32	7193.1	
5.0%	7040.11	6952.75	7128.57	
10.0%	7040.11	6952.75	7128.57	
20.0%	7040.11	6952.75	7128.57	
Auto-0.0%	6949.59	6714.32	7193.1	



Start Date: 4/11/03 End Date: 4/12/03 Sample Date: 4/11/03 Comments:	Rotifer Test Test ID: 0304-20NW Lab ID: WAAEE-AMEC NW Bi Protocol: ASTM E1440		Beazer BMSA-benzene monosulfonic acid BC-Brachionus calyciflorus
-------------------------------------------------------------------------------	-------------------------------------------------------------------------------	--	------------------------------------------------------------------



### Appendix Table C-12c. Water Quality Summary for 24-hour *Brachionus calyciflorus*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 11 April 2003

Concentration (mg/L)	Rep	Number Orgai	r of Live nisms		O :	p (pH u		Co.			erature C)	Percer Surviva
(IIIg/L)		0	24	0	24	0	24	0	24	0	24	Surviva
	A	5	5	7.8	7.5	7.99	8.06	306	311	25.6	25.3	100
	В	5	5									100
	С	5	5									100
Control	D	5	5									100
Contion	Е	5	5								7	100
	F	5	5									100
	G	5	5									100
	Н	5	5									100
	Α	5	5	7.5	7.6	7.45	7.80	725	733	25.8	25.3	100
	В	5	5									100
	С	5	5	F 7			10 70					100
1 250	D	5	5									100
1,250	E	5	5									100
	F	5	5									100
	G	5	5									100
	Н	5	5									100
	Α	5	5	7.9	7.7	7.28	7.40	1077	1080	25.9	25.1	100
	В	5	5									100
	С	5	5									100
2,500	D	5	5									100
2,300	E	5	5									100
	F	5	5									100
	G	5	5									100
	Н	5	5									100
	Α	5	5	7.5	7.6	7.13	7.21	1804	1821	25.3	25.1	100
	В	5	5									100
	С	5	5				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				il American	100
5,000	D	5	5									100
3,000	E	5	5									100
	F	5	5									100
	G	5	5									100
	H	5	5									100
	Α	5	3	7.8	7.4	6.92	7.11	3190	3190	25.3	25.0	60
	В	5	2									40
	C	5	3			7777.72						60
10,000	D	5	3									60
10,000	E	5	2									40
	F	5	3	-								60
	G	5	2								V.	40
	Н	5	3									60
	Α	5	0	7.8	7.4	6.65	6.72	5720	5790	25.0	25.3	0
	В	5	0									0
	С	5	0									0
20,000	D	5	0									0
20,000	E	5	0								.,	0
	F	5	0									0
	G	5	0									0
	Н	5	0	Sec. 19 52 5	1.		9 9				ji i ka	0

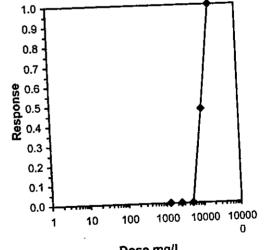
			Rotifer Te	st-24 Hr S	Survival		Decree
art Date: 4/11/03 and Date: 4/12/03 ample Date: 4/11/03	Lab	t ID: 0304- ID: WAAE tocol: ASTM	EE-AMEC NW	Bioassay S	Sample ID: Sample Ty Fest Speci	pe:	Beazer PSA-p-phenol sulfonic acid BC-Brachionus calyciflorus
omments:		3 4	5	6	7	88	
D-Control 1.0000 1250 1.0000 2500 1.0000 5000 1.0000 10000 0.6000 20000 0.0000	1.0000 1 1.0000 1 1.0000 1 0 0.4000 0	.0000 1.0 1.0000 1.0 1.0000 1.0 0.6000 0.6	000 1.0000 000 1.0000 000 1.0000 000 1.0000 000 0.4000 000 0.0000	1.0000 1.0000 1.0000 1.0000 0.6000 0.0000	1.0000 1.0000 1.0000 1.0000 0.4000 0.0000	1.0000 1.0000 1.0000 1.0000 0.6000	) ^ ) ) )

1_				Tra	nsform:	Arcsin Sq	uare Root		1.0010	1-Tailed Critical	Number Resp	Total Number
	<b>5</b>	Moan	N-Mean	Mean	Min	Max	CV%	<u> N</u>	Sum_	Cittoai	0	40
	D-Control 1250 2500 5000 *10000 *20000	1.0000 1.0000 1.0000 1.0000 0.5250 0.0000	1.0000 1.0000 1.0000 1.0000 0.5250	1.3453 1.3453 1.3453 1.3453 0.8106	1.3453 1.3453 1.3453 1.3453 0.6847 0.2255	1.3453 1.3453 1.3453 1.3453 0.8861 0.2255	0.000 0.000 0.000 0.000 12.857 0.000	8 8 8 8 8	68.00 68.00 68.00 36.00 36.00	46.00	0 0 0 19 40	40 40 40 40

 Auxiliary Tests Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	<b>Statistic</b> 0.54799	Critical 0.929	-1.3061 5.25401
Equality of variance cannot be confirmed  NOEC LOEC ChV	TU		
Steel's Many-One Rank Test 5000 10000 7071.07			

Trimmed Spearman-Karber 95% CL FC50 Trim Level

Trim Level	EC50	95%		_
IIIIII CBACI		2440.00	44251.8	
0.0%	10174.8	9119.86	11331.0	
0.070		000444	11512	
5.0%	10192.4	9024.14		
0,070	100101	8899.57	117136	
10.0%	10210.1	0099.01	11110.0	
	40045 4	0511 03	12332	
20.0%	10240.4	8511.93		
	40474 0	0110 86	11351.8	
Auto-0.0%	10174.0	9113.00	110011	_



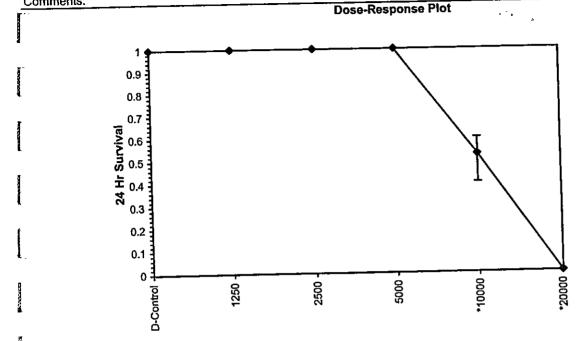
Rotifer Test-24 Hr Survival

Start Date: 4/11/03 Test ID: 0304-22NW Sample ID: Beazer

Ind Date: 4/12/03 Lab ID: WAAEE-AMEC NW Bioassa; Sample Type: PSA-p-phenol sulfonic acid

Jample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus

Comments:



Brachionus calyciflorus
Chronic Exposure

## Appendix Table C-13a. Water Quality Summary for 48-hour *Brachionus calyciflorus*Exposure to Benzene Metadisulfonic Acid (BMDSA)

Initiated: 11 April 2003

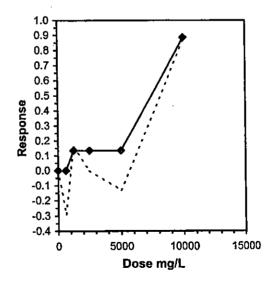
Concentration (mg/L)	Rep		r of Live nisms	DO (mg/L)		pH (pH units)		Cond. (mmhos/cm)		Temperature (°C)		
(···g·=/		0	48	0	48	Ō	48	0	48	0	48	
,	Α	1	6	7.8	7.5	7.99	8.07	306	315	25.6	25.0	
1	В	1	6									
:	C	1	5							Warning Ca		
Control	D	1	8		. 6 7 7 7 7		2 A. ()					
Control	E	1	6		::::::::::::::::::::::::::::::::::::::							
!	F	. 1	5									
	G	1	4									
	H	1	6							15. 0		
	Α	1	8	7.4	7.5	7.93	8.00	718	722	25.8	25.0	
i	В	1	8									
	С	1	7						100			
625	D	1	6									
020	Е	1	7									-
	F	1	6				- K.					
	G	1	7									
	Н	1	- 8									-
	Α	1	8	7.6	7.2	7.91	7.98	1114	1121	25.9	25.0	
1,250	В	1	4				C 38 985					
	С	1	6									
	D	1	0						33			
	E	1	6									
	F	1	4									-
	G	1	6					į – – –				
	н	1	- 5					ř				
	A	1	4	7.7	7.2	7.96	7.98	1823	1900	24.9	25.0	
	В	1	3		l [*]						20.0	
	С	1	4					.3-			_	
0.500	D	1	6									
2,500	E	1	8									
	F	1	6									
	Ğ	1	7									
	H	1	8									-
	Ā	1	6	7.4	7.1	7.98	7.96	3240	3250	25.7	25.0	_
	В	1	6									
	c	1	7									
E 000	Ď	1	8									
5,000	E	1	6		=======================================							
	F	1	8		P							
	Ġ	1	5									
	H	1	5							L		
	A	1	0	7.4	7.4	7.98	7.97	5870	5890	25.2	25.0	
	В	1	1		عزنت							
	c	1	o									
40.000	Ď	1	2									
10,000	E	<u>:</u> 1	0	Eniversal de				-				
	F	1	4									
	Ġ	<del></del>	2									
	H	<del> i -</del>	0		52,222,32							

1					F	Rotifer Te	st-Net P	oduction		
	Start Date:	4/11/03	<del>-</del>	Test ID:	0304-19N\	Ń		Sample ID	:	BEAZER
ľ	End Date:	4/13/03		Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	rpe:	BMDSA-benzene metadisulfonic acid
	Sample Date:	4/11/03		Protocol:	ASTM E14	40		<b>Test Speci</b>	ies:	BC-Brachionus calyciflorus
	Comments:									
•	Conc-mg/L	1	2	3	4	5	6	7	.8.	·
	D-Control	5.0000	5.0000	4.0000	7.0000	5.0000	4.0000	3.0000	5.0000	
	625	7.0000	7.0000	6.0000	5.0000	6.0000	5.0000	6.0000	7.0000	
	1250	7.0000	3.0000	5.0000	0.0000	5.0000	3.0000	5.0000	4.0000	
1	2500	3.0000	2.0000	3.0000	5.0000	7.0000	5.0000	6.0000	7.0000	
	5000	5.0000	5.0000	6.0000	7.0000	5.0000	7.0000	4.0000	4.0000	
i.	10000	0.0000	0.0000	0.0000	1.0000	0.0000	3.0000	1.0000	0.0000	

_					Transforn	n: Untran	sformed		1-Tailed			Isotonic		
	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean	
_	D-Control	4.7500	1.0000	4.7500	3.0000	7.0000	24.526	8				5.4375	1.0000	
٠.	625	6.1250	1.2895	6.1250	5.0000	7.0000	13.625	8	-1.904	2.306	1.6652	5.4375	1.0000	
	1250	4.0000	0.8421	4.0000	0.0000	7.0000	51.755	8	1.038	2.306	1.6652	4.7083	0.8659	
	2500	4.7500	1.0000	4.7500	2.0000	7.0000	40.182	8	0.000	2.306	1.6652	4.7083	0.8659	
	5000	5.3750	1.1316	5.3750	4.0000	7.0000	22.097	8	-0.865	2.306	1.6652	4.7083	0.8659	
-	*10000	0.6250	0.1316	0.6250	0.0000	3.0000	169.706	8	5.712	2.306	1.6652	0.6250	0.1149	

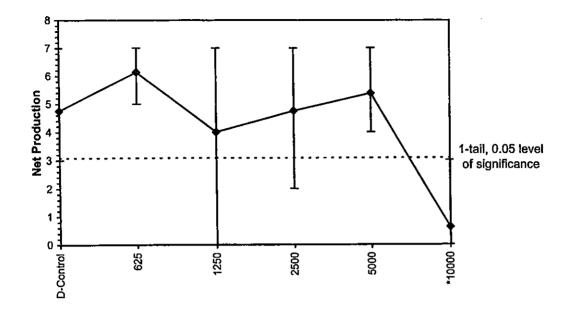
	Auxiliary Tests					Statistic		Critical		Skew	Kurt
	Shapiro-Wilk's Test indicates norm	0.01)		0.98036	•	0.929		-0.1971	0.73659		
	Bartlett's Test indicates equal varia		8.34819		15.0863						
' ۔۔	Hypothesis Test (1-tall, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	_ MSE	F-Prob	df
•	Dunnett's Test	5000	10000	7071.07		1.66519	0.35057	29.5708	2.08631	3.9E-08	5.42

				Linea	r Interpola	tion (200 Resamples)
Point	mg/L	SD	95%	CL	Skew	
IC05	858.036	1341.65	745.14	5269.44	2.4647	
IC10	1091.07	1956.08	865.281	5561.87	0.7990	
IC15	5105.87	2110.4	985.421	5843.81	-0.2517	1.0
1C20	5438.78	1716.1	1105.56	6128.8	-1.5117	0.9
IC25	5771.68	1270.07	1225.7	6411.11	-2.7593	0.8 -
IC40	6770.41	346.789	6102.4	7396.87	-0.1275	0.7
IC50	7436.22	322.338	6855.25	8078.19	0.0556	0.6



			Rotife	or Test-Net Production	
Start Date:	4/11/03	Test ID:	0304-19NW	Sample ID:	BEAZER
End Date:	4/13/03	Lab ID:	WAAEE-AMEC	NW Bioassay Sample Type:	BMDSA-benzene metadisulfonic acid
Sample Date:	4/11/03	Protocol:	ASTM E1440	Test Species:	BC-Brachionus calyciflorus
Comments:					·





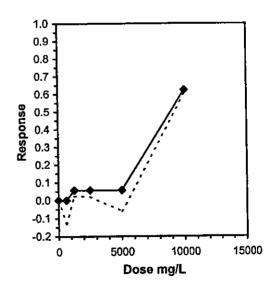
					Ro	tifer Test	-r		
Start Date:	4/11/03	•	Test ID:	0304-19N\	N	ļ	Sample ID	:	Beazer
nd Date:	4/13/03	ļ	Lab ID:	WAAEE-A	MEC NW	Bioassay:	Sample Ty	rpe:	BMDSA-benzene metadisulfonic acid
_ample Date:	4/11/03	1	Protocol:	ASTM E14	40	•	Test Speci	ies:	BC-Brachionus calyciflorus
Comments:									
Conc-mg/L	1	2	3 _	4	5	6	7	8 -	·
D-Contro	0.8959	0.8959	0.8047	1.0397	0.8959	0.8047	0.6931	0.8959	
628	1.0397	1.0397	0.9730	0.8959	0.9730	0.8959	0.9730	1.0397	
1250	1.0397	0.6931	0.8959	0.8959	0.6931	0.8959	0.8047		
2500	0.6931	0.5493	0.6931	0.8959	1.0397	0.8959	0.9730	1.0397	•
5000	0.8959	0.8959	0.9730	1.0397	0.8959	1.0397	0.8047	0.8047	•
1000	0.0000	0.3466	0.6931	0.3466					

_				Transform: Untransformed					1-Tailed			Isotonic	
<b>f</b> `C	onc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N __	t-Stat	Critical	MSD	Mean	N-Mean
1 -	D-Control	0.8657	1,0000	0.8657	0.6931	1.0397	11.645	8	<u> </u>			0.9222	1.0000
<b>L</b> .,	625	0.9787	1.1305	0.9787	0.8959	1.0397	6.105	8	-1.620	2.431	0.1696	0.9222	1.0000
	1250	0.8455	0.9766	0.8455	0.6931	1.0397	14.759	7	0.280	2.431	0.1756	0.8705	0.9440
	2500	0.8475		0.8475	0.5493	1.0397	21.430	8	0.262	2.431	0.1696	0.8705	0.9440
	5000	0.9187	1.0612	0.9187	0.8047	1.0397	10.059	8	-0.759	2.431	0.1696	0.8705	0.9440
•	*10000	0.3466		0.3466	0.0000	0.6931	81.650	4	6.076	2.431	0.2078	0.3466	0.3758

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	nal distribu	tion (p >	0.01)		0.97338		0.923		-0.1871	1.08162
3artlett's Test indicates equal var	iances (p =	0.01)	•		14.5901		15.0863	_		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob_	<u>df</u>
Bonferroni t Test	5000	10000	7071.07		0.20777	0.23999	0.23664	0.01947	5.3E-07	5, 37

Linear	Interpolation	(200	Resamples)
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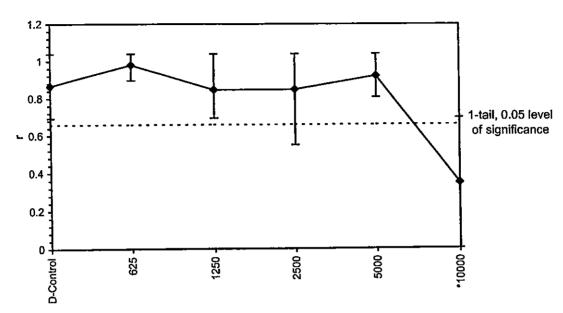
Point	mg/L	SD	95%	CL	Skew	
	1182.65	1974.43	897.493	5472.09	0.5180	
C05 C10	5386.87	1388.6	1169.99	5993.23	-2.0138	
ື iC15	5826.89	361.006	5145.46	6686.94	0.6401	
IC20			5651.67		1.0030	
C25 .C40	6706.92	516.73	6046.82	8235.82	1.1556	
.C40	8026.97					
IC50	8907.01					
-						



Start Date: 4/11/03 Test ID: 0304-19NW Sample ID: Beazer
Ind Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassa; Sample Type: BMDSA-benzene metadisulfonic acid ample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus

Comments:





# Appendix Table C-13b. Water Quality Summary for 48-hour *Brachionus calyciflorus*Exposure to Benzene Monosulfonic Acid (BMSA)

Initiated: 11 April 2003

oncentration (mg/L)	Rep		r of Live nisms		10 g/L)_	p (pH t		Co (mmhd		Tempe (°	erature C)
(g. =/		0	48	0	48	0	48	0	48	0	48
	Α	_ 1	5	7.8	7.5	7.99	8.06	306	311	25.6	25.1
	В	1	5								
	C	1	_ 5								
Control	P	1	5				200				
	_ E	1	_ 5								
	F	1	5								
	G	1	5								
	Η	1	5								
	Α	1	5	7.5	7.4	7.94	7.99	586	594	25.0	25.1
	В	_ 1	5								
	C	1	5								
625	Đ		5								
	E	1	5								
	F	1	5								
	G	1	5								
	H	1	5	7.0							
	Ą	1	5	7.3	7.3	7.91	7.95	862	880	25.1	25.4
	В	1	5	10.61							
	င္		5			7.35					
1,250	P	1	5 5								
	F	1	5		<u> </u>						<u></u>
	-	1									
	G H	1	5 5					-			
	A	1	5	7.7	7.0	7.00	7.00		4/46	25.4	
	B	1	5		7.0	7.99	7.90	1365	1410	25.4	25.3
	c	1	4								
	Ď	1	5								
2,500	E	1	5								
	F	1	5								
	G	1	5			†	=======================================				
	H	<del>-</del> i-	5								
	A	1	5	7.8	7.0	7.98	7.90	2350	2400	25.4	25.1
	В	1	5			فتنا		2000	2400	20.7	20.1
	c	1	5					7			
5.000	0	1	5								
5,000	Ē	1	5					in a second management of the		3.0	
	F	1	5								
	G	1	5					re e			
	H	1	5								
	A	1	0	7.3	7.1	7.98	7.92	4230	4300	25.6	25.1
	В	1	0								
	c	1	0								
10.000	D	1	0								
10,000	Ē	1	0								
	F	1	0								
	G	1	0			V-32.5					
	н	1	0	5.4 7.83			(3.8%) 7.6°				

AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

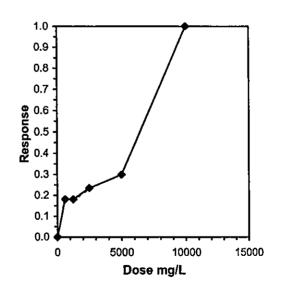
_					F	Rotifer Te	st-Net Pr	oduction		
F\$	Start Date:	4/11/03	_	Test ID:	0304-21N\	N		Sample ID	:	BEAZER
	End Date:	4/13/03		Lab ID: '	WAAEE-A	MEC NW	Bioassay	Sample Ty	pe:	BMSA-benzene monosulfonic acid
L;	Sample Date:	4/11/03	I		ASTM E14			Test Speci		BC-Brachionus calyciflorus
_(	Comments:							-		, <u>,</u>
r -	Conc-mg/L	1	2	3	4	5	6	7	-8-	
	D-Control	4.0000	7.0000	4.0000	6.0000	5.0000	5.0000	8.0000	8.0000	
L	625	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000	7.0000	
	1250	6.0000	5.0000	8.0000	4.0000	4.0000	6.0000	2.0000	4.0000	
	2500	5.0000	5.0000	5.0000	3.0000	0.0000	5.0000	6.0000	7.0000	
	5000	4.0000	5.0000	4.0000	3.0000	4.0000	5.0000	4.0000	4.0000	
	10000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

_		Mann	Mana		Moon	Heen	_		Transform	n: Untran	sformed		Rank	1-Tailed	Isot	onic
1	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean				
•	D-Control	5.8750	1.0000	5.8750	4.0000	8.0000	27.950	8			5.8750	1.0000				
•	625	4.7500	0.8085	4.7500	4.0000	7.0000	24.526	8	54.00	46.00	4.8125	0.8191				
٠.	1250	4.8750	0.8298	4.8750	2.0000	8.0000	37.081	8	58.00	46.00	4.8125	0.8191				
	2500	4.5000	0.7660	4.5000	0.0000	7.0000	47.513	8	58.00	46.00	4.5000	0.7660				
l	5000	4.1250	0.7021	4.1250	3.0000	5.0000	15.536	8	47.00	46.00	4.1250	0.7021				
	*10000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8	36.00	46.00	0.0000	0.0000				

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	ition (p >	0.01)		0.95562	0.929	-0.4489	2.04601
Equality of variance cannot be co	nfirmed		-					
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	5000	10000	7071.07					

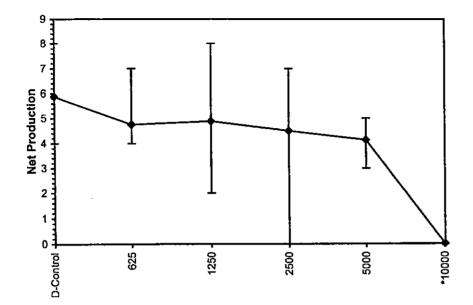
				Linea	r Interpolati	on (200 Resamples)
Point	mg/L	SD	95%	CL	Skew	
``IC05*	172.794	684.662	105.36	2729.21	2.3665	-
IC10*	345.588	978.56	210.719	3420.54	1.9049	
IC15*	518.382	1318.42	316.079	5000.54	1.3438	1.0
1C20	1700	1602.92	421.438	5294.62	0.6292	0.9
IC25	3125	1731.15	526.798	5588.71	-0.0211	0.9
IC40	5727.27	1005.65	2073.82	6470.97	-2.7248	0.8 -
IC50	6439.39	398.916	5416.04	7059.14	-0.6762	0.7

* indicates IC estimate less than the lowest concentration



Start Date: 4/11/03 Test ID: 0304-21NW Sample ID: BEAZER
End Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: BMSA-benzene monosulfonic acid BC-Brachionus calyciflorus
Comments:

#### Dose-Response Plot

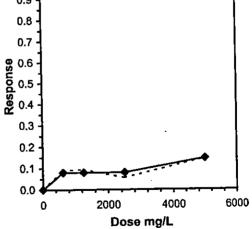


					Ro	tifer Test	-r		
Start Date:	4/11/03	1	est ID:	0304-21N\	N		Sample ID	:	Beazer
	4/13/03	L	Lab ID: WAAEE-AMEC NW Bioassay Sample Type:					rpe:	BMSA-benzene monosulfonic acid
Jample Date:	4/11/03	F	Protocol:	ASTM E14	40	•	Test Speci	ies:	BC-Brachionus calyciflorus
Comments:									
Conc-mg/L	1	2	3	<u>       4                             </u>	5	6	7	8.	_ <u></u>
D-Control	0.8047	1.0397	0.8047	0.9730	0.8959	0.8959	1.0986	1.0986	
625	0.8959	0.8047	0.8047	0.8047	0.8047	0.8047	0.9730	1.0397	•
1250	0.9730	0.8959	1.0986	0.8047	0.8047	0.9730	0.5493	0.8047	•
2500		0.8959	0.8959	0.6931	0.8959	0.9730	1.0397		
5000		0.8959	0.8047	0.6931	0.8047	0.8959	0.8047	0.8047	•

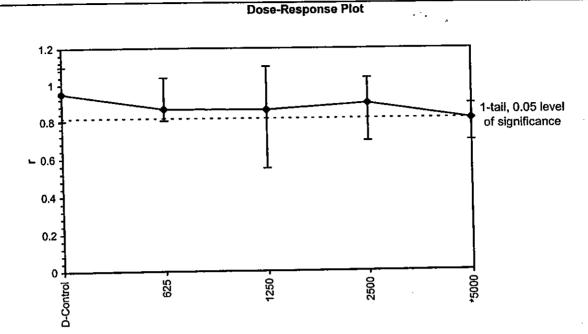
-				·	Transforn	n: Untrans	formed			1-Tailed		Isote	onic
ø	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
	D-Control	0.9514	1.0000	0.9514	0.8047	1.0986	12.613	8				0.9514	1.0000
L	625	0.8665	0.9108	0.8665	0.8047	1.0397	10.798	8	1.479	2.345	0.1345	0.8760	0.9208
	1250	0.8630	0.9071	0.8630	0.5493	1.0986	19.059	8	1.541	2.345	0.1345	0.8760	0.9208
Ø				0.8985	0.6931	1.0397	11.821	7	0.891	2.345	0.1393	0.8760	0.9208
	2500 *5000	0.8985 0.8136	0.8551	0.8136	0.6931	0.8959	7.835	8	2.402	2.345	0.1345	0.8136	0.8551

-	ilian. Tacta					Statistic		Critical		Skew	Kurt
, <u>P</u>	Auxiliary Tests Shapiro-Wilk's Test indicates norm	al distribu	tion (n > l	0.01)		0.96741		0.917		-0.3485	0.89038
3	Snapiro-vviiks rest indicates nomi		U 201	0.0.,		5.98634		13.2767			
	Bartlett's Test indicates equal varia	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
_	lypothesis Test (1-tail, 0.05)			3535.53	. –	0.13453		0.02052	0.01316	0.20755	4, 34
, E	Bonferroni t Test	2500	5000	3535.53		0.10400	0.17171	0,02002	0.0.0	•,	•

Linear Interpolation (200 Resamples) Skew 95% CL SD mg/L **Point** 394.339 IC05* 3290.66 IC10 1.0 >5000 IC15 >5000 IC20 0.9 >5000 **IC25** 0.8 >5000 IC40 >5000 IC50 0.7 * indicates IC estimate less than the lowest concentration



Start Date: 4/11/03 Test ID: 0304-21NW Sample ID: Beazer
nd Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: BMSA-benzene monosulfonic acid
Jample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus
Comments:



# Appendix Table C-13c. Water Quality Summary for 48-hour *Brachionus calyciflorus*Exposure to P-Phenol Sulfonic Acid (PSA)

Initiated: 11 April 2003

Concentration (mg/L)	Rep	Numbei Orgai	r of Live nisms	D (mg	-	pl (pH t		Cor (mmhc			erature C)	
(mg/L/		0	48	0	48	0	48	0	48	0	48	
	Α	1	7	7.8	7.5	7.99	8.06	306	315	25.6	25.1	
	В	1	7									
	С	1	7									
Control	Б	1	4							1.7		
Condo	ш	1	4				5.4.5					
	F	1	4									
	G	1	4									
	Н	1	3									
	Α	1	2	7.5	7.3	7.94	8.07	586	592	25.0	25.0	
	В	1	. 7	(A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A. 100 A								
	С	1	2				10.0					
1,250	D	1	5									
1,200	E	1	7									
	F	1	4									
	G	1	6									
	Н	11	10							,		
	Α.	1	8	7.3	7.3	7,91	8.06	862	868	25.1	25.1	
	В	1	8									
	С	1	8									
2,500	D	1	8									
	Е	1	9									
	F	. 1	0		[							
	G	1	6									
	Н	1	2									
	Α	1	8	7.7	7.2	7.99	8.05	1365	1380	25.4	25.2	
	В	1	6		311							•
	C	1	6									
5,000	D	1	3						. :			
5,000	E	1	9									
	F	1	6						7 - CV:03-	, Y		-
	G	1	7									
	Ĥ	1	8									
	Α	1	3	7.8	7.1	7.98	8.00	2350	2390	25.4	25.0	•
	В	1	0									
-	С	1	0									
10.000	Б	1	1									
10,000	Ε	1	0									
	F	1	0									
	G	1	4									
	Н	1	0						النالال			
	Α	1	0	7.3	7.2	7.98	8.01	4230	4300	25.6	25.0	
	В	1	0									
	С	1	0									
20.000	D	1	0							ľ		
20,000	E	1	0									·
	F	1	0					]				
	G	1	Ó			(						
	Н	1	0									

AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

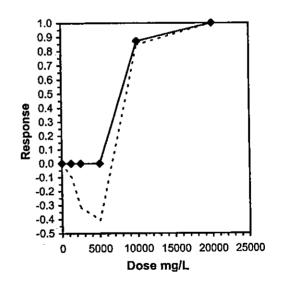
					F	Rotifer Te	st-Net Pr	oduction		
Start	Date:	4/11/03		Test ID: (	0304-23N\	N		Sample ID	:	BEAZER
End D	)ate:	4/13/03	ŧ	_ab ID: \	WAAEE-A	MEC NW	Bioassay	Sample Ty	pe:	PSA-p-phenol sulfonic acid
Samp	le Date:	4/11/03	F	Protocol: /	ASTM E14	40		Test Speci	es:	BC-Brachionus calyciflorus
Comn	nents:									
Con	c-mg/L	. 1	2	3	4	5	6	7	8	
C	-Control	6.0000	6.0000	6.0000	3.0000	3.0000	3.0000	3.0000	2.0000	>
	1250	1.0000	6.0000	1.0000	4.0000	6.0000	3.0000	5.0000	9.0000	
	2500	7.0000	7.0000	7.0000	7.0000	8.0000	0.0000	5.0000	1.0000	
	5000	7.0000	5.0000	5.0000	2.0000	8.0000	5.0000	6.0000	7.0000	
	10000	2.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	0.0000	
	20000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

-				-	Transforn	n: Untran	sformed		Rank	1-Tailed	Isoto	onic
	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
-	D-Control	4.0000	1.0000	4.0000	2.0000	6.0000	42.258	8			4.8125	1.0000
	1250	4.3750	1.0938	4.3750	1.0000	9.0000	62:223	8	70.00	46.00	4.8125	1.0000
	2500	5.2500	1.3125	5.2500	0.0000	8.0000	58.266	8	81.00	46.00	4.8125	1.0000
	5000	5.6250	1,4063	5.6250	2.0000	8.0000	32.832	8	82.00	46.00	4.8125	1.0000
	*10000	0.6250	0.1563	0.6250	0.0000	3.0000	190.038	8	39.50	46.00	0.6250	0.1299
	*20000	0.0000		0.0000	0.0000	0.0000	0.000	8	36.00	46.00	0.0000	0.0000

Auxiliary Tests	St	atistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.9	94786	0.929	-0.4928	0.86859
Equality of variance cannot be confirmed					
Hypothesis Test (1-tail, 0.05) NOEC LOEC Ch	V TU	_			

Hypothesis Test (1-tail, 0.05) NOEC LOEC CRV
Steel's Many-One Rank Test 5000 10000 7071.07

				Linea	r Interpolatio	n (200 Resamples)
Point	mg/L	ŞD	95%	CL	Skew	
IC05	5287.31	1011.27	1512.13	5336.67	-2.9846	
IC10	5574.63	668.741	3657.14	5673.34	-5.0626	
IC15	5861.94	347.017	5045.69	6010.01	-6.8171	1.0
IC20	6149.25	342.039	5378.97	6346.68	-6.9276	0.9 -
IC25	6436.57	234.129	5710.56	6683.36	-1.6342	0.8.
IC40	7298.51	252,293	6705.35	7693.37	-0.0782	0.7
1C50			7284.78		0.4411	0.6



Rotifer Test-Net Production

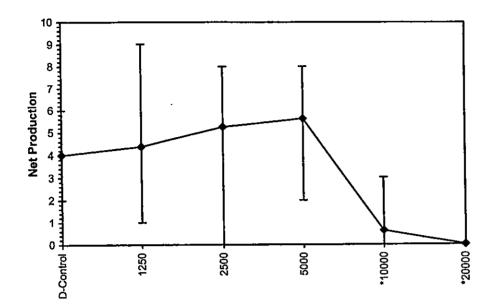
Start Date: 4/11/03 Test ID: 0304-23NW Sample ID: BEAZER

End Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: PSA-p-phenol sulfonic acid

Sample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus

Comments:

#### Dose-Response Plot

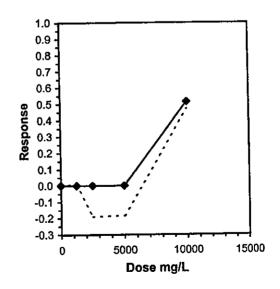


						Ro	tifer Tes	t-r		
Start	Date:	4/11/03		Test ID:	0304-23N\	N		Sample ID	:	Beazer
		4/13/03		Lab ID:	WAAEE-A	MEC NW	Bioassay	Sample Ty	pe:	PSA-p-phenol sulfonic acid
	ole Date:	4/11/03	!	Protocol:	ASTM E14	40		Test Speci	ies:	BC-Brachionus calyciflorus
Com	ments:									<u> </u>
···Cor	nc-mg/L	1	2	3	4	5	6	<u>7</u>	8.	
	O-Control	0.9730	0.9730	0.9730	0.6931	0.6931	0.6931	0.6931	0.5493	
	1250	0.3466	0.9730	0.3466	0.8047	0.9730	0.6931	0.8959	1.1513	ı
	2500	1.0397	1.0397	1.0397	1.0397	1.0986	0.8959	0.3466		
•	5000	1.0397	0.8959	0.8959	0.5493	1.0986	0.8959	0.9730	1.0397	•
	10000	0.5493	0.0000	0.6931						

-	<del></del>				Transform	n: Untrans	sformed		Rank	1-Tailed	Isoto	nic
	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	<u>Mean</u>	N-Mean_
	D-Control	0.7801	1.0000	0.7801	0.5493	0.9730	21,400	8			0.8513	1.0000
i		0.7730	0.9909	0.7730	0.3466	1.1513	38,164	8	70.00	46.00	0.8513	1.0000
	1250		• . •	0.9286	0.3466	1.0986	28.429	7	73.00	36.00	0.8513	1.0000
1	2500	0.9286	1.1903			1.0986	18.414	8	82.00	46.00	0.8513	1.0000
ı	5000	0.9235		0.9235	0.5493			_	9.50	7.00	0.4142	0.4865
K.	10000	0.4142	0.5309	0.4142	0.0000	0.6931	88.326	3	9.50	7.00	4F1 F50	0.4000

Auvillant Toots	Statistic	Critical	Skew Kurt
Auxillary Tests Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01) Bartlett's Test indicates equal variances (p = 0.38)	0.89895 4.19703	0.908 13.2767	-0.9825 0.4407
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV	TU		
Wilcoxon Rank Sum Test 10000 >10000			

				Linea	r Interpolation	(200 Resamples)
Point	mg/L	SD	95% C	L(Exp)	Skew	
IC05	5486.85	976.365	0	6449.75	-3.3442	
IC10	5973.71	835.37	4696.72	7899.5	-1.7053	
IC15	6460.56					1.0
IC20	6947.41					0.9
IC25	7434.26					0.8 -
IC40	8894.82					0.7
IC50	9868.53					0.6

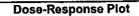


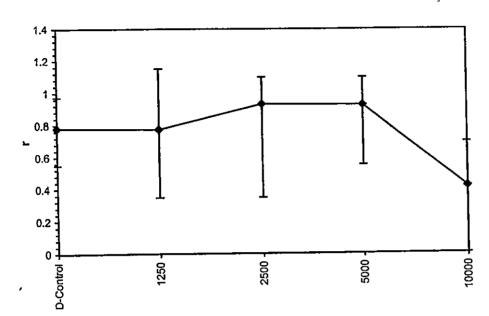
Rotifer Test-r

Start Date: 4/11/03 Test ID: 0304-23NW Sample ID: Beazer

Ind Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassa; Sample Type: PSA-p-phenol sulfonic acid ample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus

Comments:





Appendix D

Copper (II) Chloride Reference Toxicant Data

Ceriodaphnia dubia
Acute Exposure

reshwater Acut	e .	<i>i</i> .			48 H	ur To	xicity	Test 1	Data	Sheet	- AM	EC I	Bioass	ay La	bora	tory	
Client:	Tu	Lor	na. l										12		2/	15	40
Sample ID:						·							<u>1866</u>	7 -		12/13	3602 (14
Contact:	. 1		<u>.</u>										<u>C, c</u>			10.	<u>·</u>
Test #:	_()2	12114	28 A			<del></del>				Т	est Pro	tocoi:	EPA	<u> 75.</u>	AU	. <del>CO</del>	<del></del>
Concentration	Γ	Ń	umber	of	Disso	lved O	xygen		pН		Coı	nducti	vity	Te	mpera	ture	 
vall	Rep	Live	Organ	nisms		(mg/L)		( <u>p</u>	H uni			nhos-c			(°C)	· · · · ·	Percent
, <del></del>		0	24	48	0	24	48	0	24	48_	0	24	48	0	24	48	Survival
ab Control	Α	5	5	5	8.00	<u> </u>	8.2	8.28		797	17 +		246	25,/	ZT.	246	
:	В	5	5	13	75			7.5									100
ķ., .	C	5	5 194														100
<u> </u>	D.	75	5		77		0-	8.27		<i>a</i>	7 <b>0</b> 7		219	202	24	766	
3,125	A	2	5	5	7.6		70.2	0.67	-	70.	17			07.2		C (,	100
<u> </u>	B	2		3													(00)
	D	15	3	5													100
6.25	A	-	5	5	7.6	_	8,2	8.26		18. K	198		172	25./	24	246	100
0.00	В	5-	5	5													100
-	C	5	6	5													$7\infty$
	D	5	6	5													(00.
Technician Init	ials	BR	126	MO	]	. •							•	: :		-	
Animal Source:	In.	lervi	ia l	· · · · · · · · · · · · · · · · · · ·	ľ	Date Re	ceived:	N	A		_			V.			

Animal Source:	Inter	<u>val</u>	Date Re	cceived:	IA		<b>,</b>	
Comments:	0 lus:							
Collanous.	24 hrs.						AMEC Earth and Environmen	
	48 lus:	. j				·	5550 Morehouse Dr., Suite B	
ÁA Check:	06 V	4103	Final 1	Review:	1/14/03		San Diego, CA 92121 (858) 458-9044	

the first of the first parameters of the first parameters are the first parameters and the first parameters are the first parameters and the first parameters are the first parameters and the first parameters are the first parameters and the first parameters are the first parameters and the first parameters are the first parameters are the first parameters and the first parameters are the first parameters and the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first parameters are the first

48 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Internal	Start Date & Time: 12.11.03 / 1540
Sample ID: CuClz	End Date & Time: 12-13-02 /1420  Test Organism: C. Jubia
Contact:	Test Protocol: EYA 93 ACUTE

Concentration		N	umber	of	Disso	lved O	xygen	1	pН		Co	nducti	vity	Te	mperat	ture	
1 11	Rep	Live	Organ	isms	İ	(mg/L)	)	(p	H unit	is)	<b>(μ</b> ι	nhos-c	m)		(°C)		Percent
Ngl	l ttop	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48	Survival
125	Α	5	5	5	7.4	,	8.1	8.27		8.13	199		20	25,1	24:1	24.F	
7 2.3	В	5	5	5													(00)
	С	5	5	5													100
	Ď	5	5	1													80
25	Α	5	6	3	76		B.\	826		815	177		1216	22.0	1241	24.6	
	В	5	5	2													40
	С	5	I	Ø١													<i>80</i>
	D	5	1	0									<b>10</b> =	2/2	617		0
50	Α	5	0	-	7.6		8.3	8.25		1801	176		193	27.8	J-7-1	/	<u> </u>
	В	5	0														<u> </u>
	С	5	0	_													<del>                                     </del>
	D	5	0	~													
Technician Init	ials	BR	16	MD	١.	÷								•			

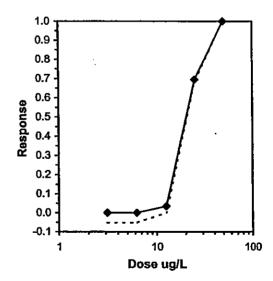
Animal Source:	Internal	Date Received:	
Comments:	0 hrs:		ALCON I I I I I I I I I I I I I I I I I I I
i i	24 hrs:		AMEC Earth and Environmental
	48 hrs:		5550 Morehouse Dr., Suite B
QA Check:	ap 1/4/	73 Final Review: 24 1/14/03	San Diego, CA 92121 (858) 458-9044

ı					Daphnia Acute	Survival Bio	ssay-48 Hr Survi	val
	Start Date:	12/11/2002		Test ID:	021211CDRA	- <u>-</u>	Sample ID:	REF-Ref Toxicant
ſ	End Date:	12/13/2002		Lab ID:	AEESD-AMEC	Bioassay SD	Sample Type:	CUCL-Copper chloride
L	Sample Date:			Protocol:	EPAA 93-EPA	Acute	Test Species:	CD-Ceriodaphnia dubia
	Comments:							
ď	Conc-ug/L	1	2	3	4			
1	L-Lab Control	1.0000	1.0000	0.8000	1.0000		· •	
L,	3.125	1.0000	1.0000	1.0000	1.0000			
	6.25	1.0000	1.0000	1.0000	1.0000			
8	12.5	1,0000	1.0000	1.0000	0.8000			
	25	0.6000	0.4000	0.2000	0.0000			
L,	50	0.0000	0.0000	0.0000	0.0000			

			_	Tra	ansform:	Arcsin Sc	uare Roof	t	Rank	1-Tailed	Number	Total
ſ	Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
į	L-Lab Control	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4			1	20
۱,	3.125	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
	6.25	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
1	12.5	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	18.00	10.00	1	20
	*25	0.3000	0.3158	0.5650	0.2255	0.8861	50.368	4	10.00	10.00	14	20
•,	*50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20

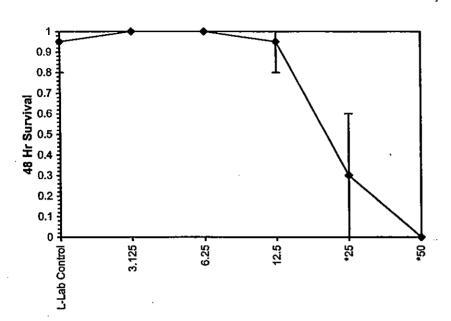
	Auxillary Tests					Statistic	Critical	Skew	Kurt
ş	Shapiro-Wilk's Test indicates non	-normal dis	tribution	(p <= 0.01)	-	0.81693	0.884	-0.4309	3.87537
Ĭ	Equality of variance cannot be con	nfirmed							
Ĺ,	Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	ΤU				
	Steel's Many-One Rank Test	12.5	25	17.6777					
-									

		-		-	Trimmed Spearman-Karber
Tri	m Level	EC50	95%	CL	<u>-</u>
	0.0%	21.333	18.300	24.869	
	5.0%	21.300	18.164	24.978	
,	10.0%	21.045	17.718	24.996	1.0 -
	20.0%	20.609	16.940	25.073	
. /	Auto-0.0%	21.333	18.300	24.869	0.9

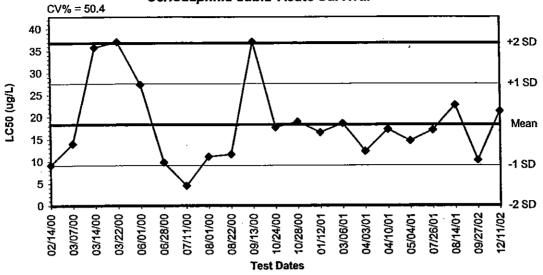


Start Date: 12/11/2002 Test ID: 021211CDRA Sample ID: REF-Ref Toxicant
End Date: 12/13/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: CUCL-Copper chloride
Sample Date: Protocol: EPAA 93-EPA Acute Test Species: CD-Ceriodaphnia dubia
Comments:

Dose-Response Plot



## Copper (II) Chloride Reference Toxicant Control Chart Ceriodaphnia dubia Acute Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/14/00	9.1505	18.3302	9.0935	0.0000	27.5668	36.8034
03/07/00	13.9759	18.3302	9.0935	0.0000	27.5668	36.8034
03/14/00	35.7935	18.3302	9.0935	0.0000	27.5668	36.8034
03/22/00	37.0991	18.3302	9.0935	0.0000	27.5668	36.8034
06/01/00	27.3873	18.3302	9.0935	0.0000	27.5668	36.8034
06/28/00	9.8073	18.3302	9.0935	0.0000	27.5668	36.8034
07/11/00	4.5096	18.3302	9.0935	0.0000	27.5668	36.8034
08/01/00	11.0857	18.3302	9.0935	0.0000	27.5668	36.8034
08/22/00	11.5810	18.3302	9.0935	0.0000	27.5668	36.8034
09/13/00	37.0991	18.3302	9.0935	0.0000	27.5668	36.8034
10/24/00	17.6777	18.3302	9.0935	0.0000	27.5668	36.8034
10/28/00	18.9673	18.3302	9.0935	0.0000	27.5668	36.8034
01/12/01	16.5712	18.3302	9.0935	0.0000	27.5668	36.8034
03/06/01	18.5886	18.3302	9.0935	0.0000	27.5668	36.8034
04/03/01	12.3146	18.3302	9.0935	0.0000	27.5668	36.8034
04/10/01	17.2636	18.3302	9.0935	0.0000	27.5668	36.8034
05/04/01	14.6594	18.3302	9.0935	0.0000	27.5668	36.8034
07/26/01	17.1037	18.3302	9.0935	0.0000		l,
08/14/01	22.7158	18.3302	9.0935	0.0000	27.5668	
. 09/27/02	10.2488	18.3302	9.0935	0.0000	27.5668	
12/11/02	21.3334	18.3302	9.0935	0.0000	27.5668	36.8034

Ceriodaphnia dubia

**Chronic Exposure** 

Bioassay Laboratory Seven Day Chronic Bioassay 5550 Morchouse Dr., Suite B C. dubia Test Species: San Diego, CA 92121 1615 Test Date/Time: Client: DZIZIOCDRT Test No: Sample ID: Concentration Concentration Day Day 8 19 1021 8.12 823 1827 pH 815 18.03 18.06 pH DO (mg/L) 198 193 198 199 289 24.8 256 250 DO (mg/L) Cond. (sunhos-cm) 704 200 199 Cond. (jumlios-cm) 197 Temp (°C) Temp (°C) pH 18.05 1.90 10F 8.02 7.93 pll. 1.2 DO (mg/L) 81 184 DO (mg/L) Temp (°C) Temp (°C) 100 Concentration Concentration : Day Day pH 8028-24 811 16.01 8.11861 pl4 80 DO (mg/L) DO (mg/L) Cond. (umhos-cm) Cond. (numbos-cm) Temp (°C) Temp (°C) 794 900 600 MAT 784 801 8.52 7.94 pH pH DO (mg/L) DO (mg/L) Temp (°C) 242 Temp (°C) Concentration Concentration Day Day **** 8.15 19.66 817 8.15 8.13 818 18.26 pH pH DO (mg/L) DO (mg/L) 198 198 195 Cond. (junitos-cm) 196 148 Cond. (jimhor-em) 249 249 252 250 744 Temp (°C) Temp (°C) 793 798 7,93 4,03 8/2 0:06 791 602 pН DO (mg/L) 9 80 82 811 DO (mg/L) Temp (°C) Temp (°C) Analysts: · (M) Comments: Date Received: NA Animal Source: Final Review: QA Check:

gar a company was market by the

 $\operatorname{Fin}_{n}$ 

AMEC Earth and Environmental Bioassay Laboratory 5550 Morehouse Dr., Suite B San Diego, CA 92121

Client	/Sam	nle 🕽	D:

Internal / CUCLZ

Start Date: 12.10.02

End Date: 12/17/02

Test Number:

02/2/030RT

End Time: 1415

				Daily	Reprod	uction/ S	Survival	-			
Conc.	Rep		11 2		1117			7	8	Total	- QA
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		X		1 11	a a	13	24	V		43_	2461
	4	<del>- 75</del>	<u> </u>	60-	130	6	14	V.	T <del>-</del>	32	
	- 5	ブ	1/2	14	1 10	0	Ta-			40	
	6	<del>- X-</del>	<del>  ~</del> -	170	10	0	143	V		[2b_	
	7	<del>- // -</del>	1 7 T	1 😤	15%	0	13	1/		2	
	8	<del>7) ·</del>	<del>  8                                   </del>	10	1-4	14	16	V,		37	
	9	<del>- %</del> -	10	8	<del>  8  </del>	175	25	T V		46	
	10	- (**	<del>  ~ -</del>	18	<del>  ++</del>	177	114	· /		30	
Analyst	212	प्रहे	15/-	An	13312	126	(WM)	שנו			

	;			Daily 1	Reprodu	iction/ S	urvival	<del></del>			
Conc.	Rep		2	à			6		8	Total	QA
30	1	6	0	6	6	12	19		_=_	3/	
	2	0.	0	16	14	0	25			42	
	3	0	0	T7	} (4	U	18	V_		141_	
	4	0	0	6	76	0_	スス	1/	_	44	
	5	0	0	16	14.	Ø_	124	V		4-4	
	6	٥	ь	7	12	0_	16			29	
	7	Ŏ	D	1-7	12	20	$\mathcal{O}$	1/	~	39	
	8	ŏ	0	. 6	14	0	19		- <	40 ACV A	37
	9	à	n	6	13	0	21_	(d)	)	1401	<u>L</u> :
	10	<u> </u>	16	<del>1-7</del>	(1)	16	23		_	46	23R

				Daily 1	Reprodu	iction/ S	urvival		and a second		
Conc.	Rep			3.	<b>V</b>	5	6	7 )		Total	QA_
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	2	~	ח	1 7	٦,3.	5	9			27	
	3	<del>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </del>	<del>                                      </del>	170	174	0	122	1//		4.2	
	4	<u> </u>	<u> </u>	<del>  <u> </u></del>	1 13	0	30			40	
	-	<del>       </del>	<del>  × -</del>	<del>  </del>	1-11-	<del></del>	20	V.	~	.39	22.80
	6	<del>- X -</del>	<del>  ''</del>	(0	<del>                                      </del>	12	25	1	-	4-3	
		<del>- × -</del>	<del>  X-</del>	<del>                                     </del>	<del>l ă</del>	6	173	17	-	28	
	- <del>/</del> R	<del>- 9</del> -	<del> -X</del>	<del>  X-</del>	<del>├─</del> र्	10	178	1-7	-	34	
		<del>-9</del>	<del> </del>	<u> </u>	<del> </del>	10	120	<del>                                     </del>		42	
	9	<u>V</u>	<u> </u>	<del>- 7</del>	<del>    }}&lt;</del>	1-12-	194-	<del>┤╌Ў∕</del> ─		125	
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				Daily I	Reprodu	ction/S	urvival				
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700	1	8	0	0	7	/3	5/6			33/4	
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	5	0	Ö	Va	-		<u> </u>			110	
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	9	^	O	7	77	0	15.		,	37	
	10	~	Ū	6	10	0	14	\	-	30	

		-		Daily	Reprodu	iction/ S	urvival			}	
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	4	<u>. (j) .</u>	i o	10	70	70	20	1		36	رع کر
	5	0	Ď	7	16_	14	20			<u> </u>	2000
	6	0	0	5	118	Ó	16	<i>V</i>		<u> - ط</u>	<u></u>
	7	0	U	6	W	0	117	1/		حنجا	<u> </u>
	8	-0	0	٠7	16	0	18	~_/		41	<u></u>
	9	0	0_	5	T   V	0_	19	V/		38	
	10	Ð	0		1/3	U.	120	/	<u> </u>	139	<u> </u>
								•		-	

		<u> </u>		Daily	Reprodu	ction/ S	urvival				
Conc.	Rep	1 1	2	5		4	6	7	8	Total	QA
200	1	070								0/2/	
ŤĬ	2	6		01d						Old,	
	3	0.	011							0/00	
	4	0/11.	1		<u> </u>					0/66	
	5	0/1			-					0/d.	
	6	0/2			-					0/d.	
	7	0/1					-			0/2	
	8	0/1								0/1/	
	9	0/1	<del> </del>							0/0/1	
	10	072	-				-			0/9	

Time Fed (day): (0) 16 15 (1) 1600 (2) 1015 (3) 1020 (4) 1400 (5) [140 (6) 150 (7) (8)

Comments:

-- lewed ---- -- --- 1114/22

QA checked: 8 12 37 02

			Cerioda	phnia Sur	vival and	Reprodu	ction Tes	t-7 Day S	urvival	
Start Date:	12/10/2002		Test ID: 0	)21210CD	RT		Sample ID	:	REF-Ref T	oxicant
End Date:	12/17/2002	•	Lab ID: /	AEESD-AN	MEC Bioas	ssay SD S	Sample Ty	pe:	CUCL-Cop	per chloride
Sample Date:			Protocol: E	EPAF 94-E	PA Fresh	water Ch	Test Speci	es:	CD-Ceriod	aphnia dubia
Comments:										
Conc-ug/L	1	2	3	4	5	6	7	8	9	10
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	1.0000	1.0000
200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

·—					Not			Fisher's	1-Tailed	Number	Total
C	onc-ug/L	Mean	N-Mean	Resp	Resp	Total	N	Exact P	Critical	Resp	Number
L-L	ab Control	1.0000	1.0000	0	10	10	10		<del>-</del>	0	10
ι,	12.5	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
	25	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
[	50	0.9000	0.9000	1	9	10	10	0.5000	0.0500	1	10
L.,	*100	0.3000	0.3000	7	3	10	10	0.0015	0.0500	7	10
•	*200	0.0000	0.0000	10	0	10	10	0.0000	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	50	100	70.7107	

-		•		Max	imum Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	6.41183	1.89248	2.70258	10.1211	0	0.10081	7.81472	0.99	1.90847	0.15596	4
Intercept	-7.2368	3.62549	-14.343	-0.1308							
TSCR						1.0 ¬			···/·	77	
Point	Probits	ug/L		cial Limits		0.9			-H		
EC01	2.674	35.1278	10.6035	50.2789					- 11 /	ļ	
EC05	3.355	44.8682	18.5832	59.8706		0.8 -			- I <b>I</b> /		
EC10	3.718	51.121	24.8952	66.1517		0.7				1	
EC15	3.964	55.825	30.1809	71.0953		-			11/		
EC20	4.158	59.8703	35.0253	75.6002		9.0.6 0.5 0.4			H/		
EC25	4.326	63.5737	39.6345	80.0178		0.5			HH		
- EC40	4.747	73.9537	52.7601	94.7097		isi .	1		H	i	
EC50	5.000	80.9976	61.1361	107.443		<b>₽</b> 0.4 -	1		/ <b> </b>		
EC60	5.253	88.7125	69.3158	124.571		0.3 -	1		/ <b> </b>	ŀ	
EC75	5.674	103.197	81.986	165.939		0.2 -	1	/	11	1	
EC80	5.842	109.58	86.7615	187.809			}		H		
EC85	6.036	117.521	92.245	217.988		0.1 -	<b>j</b>		<b>?</b> /		
EC90	6.282	128.335	99.1254	264.306		0.0	<del>]                                    </del>	····	<u>'                                    </u>		
EC95	6.645	146.22	109.511	354.126			1	10.	100	1000	
EC99	7.326	186.764	130.387	620.697				Dose u	iall		

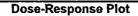
Ceriodaphnia Survival and Reproduction Test-7 Day Survival

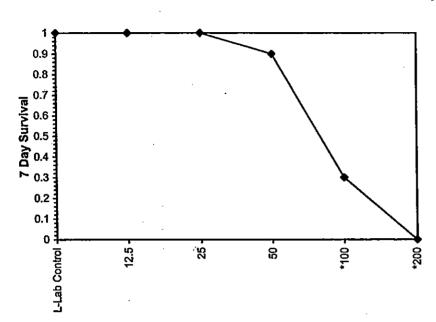
Start Date: 12/10/2002 Test ID: 021210CDRT Sample ID: REF-Ref Toxicant

End Date: 12/17/2002 Lab ID: AEESD-AMEC Bioassay SD Sample Type: CUCL-Copper chloride

Sample Date: Protocol: EPAF 94-EPA Freshwater Ct Test Species: CD-Ceriodaphnia dubia

Comments:



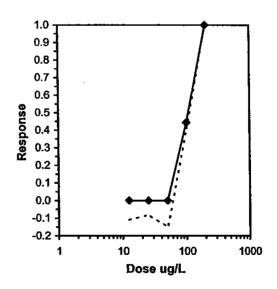


	_	-	Cerioda	ıphnia Sui	rvival and	Reprodu	ction Tes	t-Repro	duction	
Start Date:	12/10/2002	<u>'</u>	Test ID:	021210CD	RT	(	Sample ID	:	REF-Ref T	oxicant
Ind Date:	12/17/2002	<u>)</u>	Lab ID:	AEESD-A	MEC Bioas	ssay SD 3	Sample Ty	pe:	<b>CUCL-Cop</b>	per chloride
Sample Date:			Protocol:	EPAF 94-E	PA Fresh	water Ch	Test Speci	ies:	CD-Ceriod	aphnia dubia
Comments:							_			
Conc-ug/L	1	2	3	4	_5_	6	7	.8 ,	9	10
Lab Control	25.000	31.000	43.000	32.000	40.000	36.000	31.000	37.000	46.000	32.000
12.5	44.000	39.000	42.000	40.000	39.000	43.000	28.000	34.000	43.000	40.000
25	43.000	41.000	34.000	36.000	41.000	36.000	33.000	41.000	38.000	39.000
50	37.000	42.000	41.000	44.000	44.000	34.000	39.000	39.000	40.000	46.000
100	33.000	9.000	28.000	29.000	1.000	10.000	0.000	36.000	37.000	30.000
200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

_				•	Transforn	n: Untran:	sformed		Rank	1-Tailed	<u> </u>	
	Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
	L-Lab Control	35.300	1.0000	35.300	25.000	46.000	18.018	10			35.300	0.0000
۹,	12.5	39.200	1.1105	39.200	28.000	44.000	12.428	10	124.00	75.00	39.200	-0.1105
	25	38.200	1.0822	38.200	33.000	43.000	8.796	10	122.50	75.00	38.200	-0.0822
Г	50	40.600	1.1501	40.600	34.000	46.000	8.858	10	131.50	75.00	40.600	-0.1501
	*100	21.300	0.6034	21.300	0.000	37.000	68.646	10	75.00	75.00	21.300	.0.3966
•	*200	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	75.00	0.000	1.0000

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non	-normal dis	tribution	(p <= 0.01)		1.21543	1.035	-0.6872	2.17512
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	50	100	70.7107					

,					Trimmed Spearman-Karber
Trim L	evel	EC50	95%	CL	
-	0.0%	103.94	83.60	129.24	
	5.0%	104.34	81.87	132.99	
. 1	0.0%	104.75	79.58	137.87	1.0 _T
2	20.0%	105.55	72.45	153.78	0.9
Auto	-0.0%	103.94	83.60	129.24	——— 0.8 -
		_			U.8 1



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: End Date: 12/10/2002 12/17/2002 Test ID: 021210CDRT

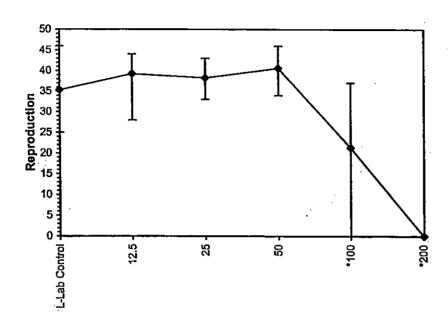
Sample ID:

REF-Ref Toxicant CUCL-Copper chloride

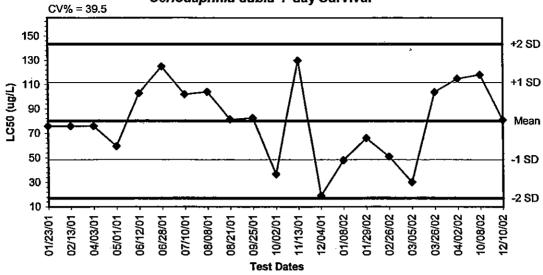
Sample Date: Comments: Lab ID: AEESD-AMEC Bioassay SD Sample Type: Protocol: EPAF 94-EPA Freshwater Ct Test Species:

CD-Ceriodaphnia dubia

#### Dose-Response Plot

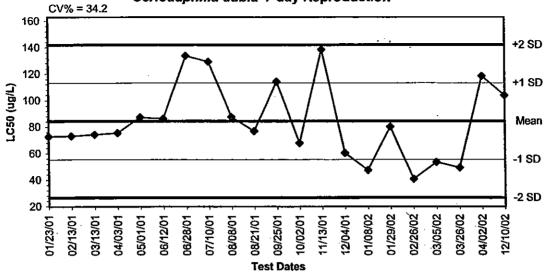


### Copper (II) Chloride Reference Toxicant Control Chart - Ceriodaphnia dubia 7-day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/23/01	75.7858	. 80.0650	48.4725	16.8799	111.6575	143.2500
02/13/01	75.7858	80.0650	48.4725	16.8799	111.6575	143.2500
04/03/01	75.7858	80.0650	48.4725	16.8799	111.6575	143.2500
05/01/01	59.3503	80.0650	48.4725	16.8799	111.6575	143.2500
06/12/01	102.8499	80.0650	48,4725	16.8799	111.6575	143.2500
06/28/01	124.8774	80.0650	48.4725	16.8799	111.6575	143.2500
07/10/01	101.8408	80.0650	48.4725	16.8799	111.6575	143.2500
08/08/01	103.9259	80.0650	48.4725	16.8799	111.6575	143.2500
08/21/01	81.2252	80.0650	48.4725	16.8799	111.6575	143.2500
09/25/01	82.3422	80.0650	48.4725	16,8799	111.6575	143.2500
10/02/01	36.5766	80.0650	48.4725	16.8799	111.6575	143.2500
11/13/01	129.6840	80.0650	48.4725	16.8799	111.6575	143.2500
12/04/01	18.9299	80.0650	48,4725	16.8799	111.6575	143.2500
01/08/02	47.8575	80.0650	48.4725	16.8799	111.6575	143.2500
01/29/02	65.9028	80.0650	48.4725	16.8799	111.6575	143.2500
02/26/02	50.9438	80.0650	48.4725	16.8799	111.6575	143.2500
03/05/02	30.0123	80.0650	48.4725	16.8799	111.6575	143.2500
03/26/02	103.7274	80.0650	48.4725	16.8799	111.6575	143.2500
04/02/02	114.8698	80.0650	48,4725	16.8799	111.6575	143.2500
10/08/02	118.0938	80.0650	48.4725	16.8799	111.6575	143:2500
12/10/02	80.9976	80.0650	48.4725	16.8799	111.6575	143.2500

### Copper (II) Chloride Reference Toxicant Control Chart - Ceriodaphnia dubia 7-day Reproduction



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
0.1/23/01	72.7564	84.3264	55.5010	26.6755	113.1518	141.9773
02/13/01	73.2301	84.3264	55.5010	26.6755	113.1518	141.9773
03/13/01	74.2706	84.3264	55.5010	26.6755	113.1518	141.9773
04/03/01	75.5240	84.3264	55.5010	26.6755	113.1518	141.9773
05/01/01	87.2951	84.3264	55.5010	26.6755	113.1518	141.9773
06/12/01	86.0807	84.3264	55.5010	26.6755	113.1518	141.9773
06/28/01	133.7090	84.3264	55.5010	26.6755	113.1518	141.9773
07/10/01	129.1806	84.3264	55.5010	26.6755	113.1518	141.9773
08/08/01	87.5478	84.3264	55.5010	26.6755	113.1518	141.9773
08/21/01	76.9022	84.3264	55.5010	26.6755	113,1518	141.9773
09/25/01	114.1681	84.3264	55.5010	26.6755	113.1518	141.9773
10/02/01	67.9029	84.3264	55.5010	26.6755	113.1518	141.9773
11/13/01	138.4422	84.3264	55.5010	26.6755	113.1518	141.9773
12/04/01	60.4050	84.3264	55.5010	26.6755	113.1518	141.9773
01/08/02	47.3164	84.3264	55.5010	26.6755	113.1518	141.9773
01/29/02	80.1282	84.3264	55.5010	26.6755	113,1518	141.9773
02/26/02	40.7986	84.3264	55.5010	26.6755	113.1518	141.9773
03/05/02	53.5714	84.3264	55.5010	26.6755	113.1518	141.9773
<b>03/26/02</b>	49.3421	84.3264	55.5010	26.6755	113.1518	141.9773
04/02/02	118.3415	84.3264	55.5010	26.6755	113,1518	141.9773
12/10/02	103.9416	84.3264	55.5010	26.6755	113.1518	141.9773

Pimephales promelas

Freshwater 96-hr Acute with Renewa	rechwater	96-hr	Acute	with	Renewa
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## 96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Sample ID: Contact:	In-	Krr	1 <u>a</u>	<u>/</u> _		· · ·		· 	<u> </u>						End	Date Test (	e & T e & T Organ	ime: _ ism: _	12	Pro	/02 010	da.						<del>-</del>	
Test #:	12/	UI Pr	2 P.	A		• •										Test	Prote	ocol:	E	PA	<u> </u>	na	بالر						
	· · · · · · · · · · · · · · · · · · ·								D.C	 D,			•	<del></del>	pΗ	I	_				ctivit	1		Test	Tem		ıre		%
Concentration	-	1	Jum	ber	of				(mg	/L)_				!	(pH u		ı <del></del>		(	-	s-cm	<del>}</del> -			(°( Init.	<del></del>			Surv.
Note	Rep		e Oı						Init.	<del></del>					Init.			26		Init.		96	0	24	48	48	72	96	Bury.
701		0 2	4 4		_		0	24	48	48	72	96	0	24	48	48	72	96	0.	48	48				19.5			<del></del>	90
LabControl	Α	10 0			9	9	7,5	8.2	9.0	8:4	<b>3</b> .1	D- T	<b>€</b> (0	ध्राप	7.13	שמע	<i>ъ</i> . и	D110	147		**	ru	•	0.5	11.7	,		91.2	100
	В	1011	<del></del>	/) /		10	<u>, , , , , , , , , , , , , , , , , , , </u>			<b>Ф</b> П	·	<b>Υ</b> /	Ø 1	4 08	193	ŞıK	צמט	<i>Q</i> /a	\Q 2	M	19.S	FΩ	194	105	20.0	20.1	19.7	2/40	80
/5	<u>A</u>	10 1		<del>-</del> +		8	(A)((A)()	886686			3000000		******				833333			200000				10000	4 888 888	200.000		100000001	80
	B	10 11		의	9	7	<b>⊼</b> ₹	<b>b</b> . 1	4	0 L	2 Z	ď.	2 12	<b>(</b> 3)	4.04	ጵስዛ	801	8.//	197	nu	197	86	194	20.5	20.0	20.1	19,6	21.0	(eO
30	A B	10 6		0	9	9			3333333		M20000000	2000		*****		3000		1000000		**********			2000	42.22	4.000000	**********	86 88 88	20000000	90
- / "					4	4	7 L	8. n	4.0	ςŪ	BE	7.3	Bus	8.69	द्या०	803	805	816	10	m	194	188	194	20.5	20.0	20.1	19.6	10	40
60	A B			<del></del>	7	7	***	***			***				4	****			*****			1000				000000			Leo
120	A	70	_	_	<del>\</del>	1	ط٦	B. L	8.0	85	8.5	8.4	8.11	B. a	8.10	So.	8.06	8.15	196	169	197	88	14.4	120.4	.Z0.0	20.1	19.5	240	10
100	- <del></del> B	1/ 🗸		3	2	1	W W.	A-000									18888	10000	*****	1000000	1000			4.000				10000001	20
240		<b>/ ~   -</b>	2	Ħ	1	ī	ط.1	Q,u	9,0	84	8.1	8.5	8,15	8.00	8.61	807	8.08	8.16	194	168	199	186	194	20.(	193	201	19.6	71.0	10
5-70	В	10	7†		1	1																							10
	Α															2002000	S STOCKES		:0000000	S 22.000	<u> </u>		:	3 33 33 33	\$ 333333				<del></del>
	В																												,
Technician In	itials	PH (	26 /	<b>V)</b>	AH	06	]	٠															•						
Animal Source:		B5					, -					Date	Rece	eived	:	16	7/6	102			-		•		•				
Comments:	0 hrs:		14	a	la	ÛŚ	de	10	ر ر ح	ní	45	at.									_			43/	re (~ re	'arth '	and F	Inviro	nmental
	24 hrs.				(	<u>)                                    </u>	<u> </u>	· •	<u> </u>		<u>:</u>	<u></u> .				,	<del></del> ~				-		•	•		-		r., Sui	
	48 hrs.	_Fe	2	08	<u> 4.5</u>	<u> </u>		•	<b>y</b> .												-				Dieg			-	.0 15
	72 hrs.	-				<u> </u>			<del></del>					·		-					_		•		8) 45i				
	96 hrs.							·			<del></del>		<del></del>					<del></del>			-			(	-,				
QA Check:	<u>a</u>	1/14	1	03	<del></del>	· ·	-	-				Fin	ıal Re	eview	: 🔏	6	1/11	10-	<u>3</u>	<del></del>	_								.•

				Acute Fish Test-96	Hr Survival	
Start Date:	12/11/2002		Test ID:	021211PPRA	Sample ID:	REF-Ref Toxicant
End Date:	12/15/2002		Lab ID:	<b>AEESD-AMEC Bioassay SD</b>	Sample Type:	CUCL-Copper chloride
Sample Date:			Protocol:	EPAA 93-EPA Acute	Test Species:	PP-Pimephales promelas
Comments:						
Conc-ug/L	1	2				
L-Lab Control	0.9000	1.0000				
15	0.8000	0.8000	ı			
30	0.6000	0.9000	I		•	
60	0.4000	0.6000	ı			
120	0.1000	0.2000	+	•		
240	0.1000	0.1000	1		4	

			Tra	ansform:	Arcsin Sc	uare Roc	t		Ì	lumber	Tot	al
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	Ν.	, 		Resp	Num	ber
L-Lab Control	0.9500	1.0000	1.3305	1.2490	1.4120	8.661	2		_	1	·	20
15	0.8000	0.8421	1.1071	1.1071	1.1071	0.000	2			4		20
30	0.7500	0.7895	1.0676	0.8861	1.2490	24.041	2			5	ı	20
60	0.5000	0.5263	0.7854	0.6847	0.8861	18.129	· 2			10	•	20
120	0.1500	0.1579	0.3927	0.3218	0.4636	25.550	2		ì	. 17	•	20
240	0.1000	0.1053	0.3218	0.3218	0.3218	0.000	· 2			18	1	20

Auxillary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed	• • •	<del></del>		
Equality of variance cannot be confirmed				
· · · · · · · · · · · · · · · · · · ·	Manufacture I Shoulth and Donalett			

			•	M	axlmur	n Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	cial Limits	* 1	Control	Chi-Sq	Critical	P-value	Mu	Sigma	lter
Slope	2.22138	0.47037	1.29946	3.14331		0.05	1.63108	7.81472	0.65	1.7606	0.45017	5
Intercept	1.08902	0.87069	-0.6175	2.79557								
TSCR	0.05837	0.05097	-0.0415	0.15828		1	1.0 -				_	
Point	Probits	ug/L	95% Fidu	cial Limits								
EC01	2.674		0.72391	12.0499	÷		0.9 -	ì		19/		
EC05	3.355	10.4747	2.3755	20.2379			0.8 -			71./	Į.	
EC10	3.718	15.2647	4.44875	26.8437		•	0.7 -		:	H/	l l	
EC15	3.964	19.6803	6.76449	32.618			, 0.7			///		
EC20	4.158	24.0841	9.40285	38.2233			<b>9</b> , 0.6 -	1	/	H		
EC25	4.326	28.6397	12.4261	43.9583			95uodsey	٠ .	/	II		
EC40	4.747	44.3154	24.4501	64.1454			නු		/1	7 .		
EC50	5.000	57.624	35.6438	82.99	•		<b>2</b> 0.4 -	1.	/ <b>/ /</b>	ŀ	1	
EC60	5.253	74.9295	50.117	111.324			0.3 -		- / I)	•	-	
EC75	5.674	115.941	80.5849	198.789				<b>†</b>	- / <b>L</b> J			
EC80	5.842	137.872	94.8217	256.758	,		0.2 -	· .	_/ <b>√</b> /			
EC85	6.036	168.723	113.238	350.217			0.1 -	ł	/ ]/			
EC90	6.282		139.791	524.156	•	.'	0.0		<u> </u>			
EC95	6.645	317.006	188.031	967.989				.1 1	10	100 10	00 10000	
EC99	7.326	642,474		3137.16					Doco i		<b>Α</b> ΙΟ <b>ΟΟ</b> Ο	

Acute Fish Test-96 Hr Survival

Start Date: ind Date:

12/11/2002 12/15/2002

Test ID: 021211PPRA

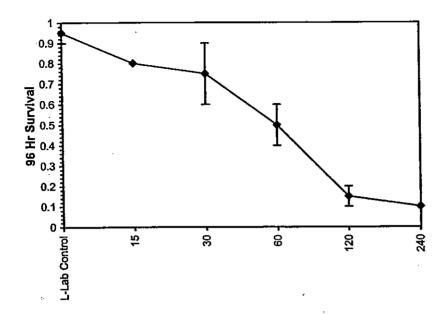
Lab ID: AEESD-AMEC Bioassay SD Sample Type: Protocol: EPAA 93-EPA Acute

Sample ID: **Test Species:**  **REF-Ref Toxicant** CUCL-Copper chloride PP-Pimephales promelas

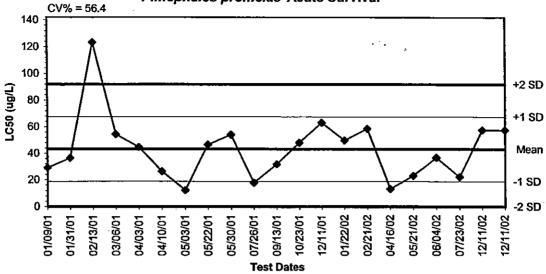
Comments:

sample Date:

Dose-Response Plot



### Copper (II) Chloride Reference Toxicant Control Chart - Pimephales promelas Acute Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/09/01	29.1004	43.1834	18.8432	0.0000	67.5235	91.8636
01/31/01	36.4195	43.1834	18.8432	0.0000	67.5235	91.8636
02/13/01	123.3779	43.1834	18.8432	0.0000	67.5235	91.8636
03/06/01	54.4075	43.1834	18.8432	0.0000	67.5235	91.8636
04/03/01	44.7056	43.1834	18.8432	0.0000	67.5235	91.8636
04/10/01	26.3860	43.1834	18.8432	0.0000	67.5235	91.8636
05/03/01	12.2396	43.1834	18.8432	0.0000	67.5235	91.8636
05/22/01	46.5890	43.1834	18.8432	0.0000	67.5235	91.8636
05/30/01	54.0560	43.1834	18.8432	0.0000	67.5235	91.8636
07/26/01	17.8228	43.1834	18.8432	0.0000	67.5235	91.8636
09/13/01	31.7269	43.1834	18.8432	0.0000	67.5235	91.8636
10/23/01	48.0259	43.1834	18.8432	0.0000	67.5235	91.8636
12/11/01	63.1292	43.1834	18.8432	0.0000	67.5235	91.8636
01/22/02	49.7598	43.1834	18.8432	0.0000	67.5235	91.8636
02/21/02	58.5418	43.1834	18.8432	0.0000	67.5235	91.8636
04/16/02	13.1365	43.1834	18.8432	0.0000	67.5235	91.8636
05/21/02	23.1358	43.1834	18.8432	0.0000	67.5235	91.8636
06/04/02	36.7981	43.1834	18.8432	0.0000	67.5235	91.8636
07/23/02	22.2447	43.1834	18.8432	0.0000	67.5235	91.8636
12/11/02	57.6240	43.1834	18.8432	0.0000	67.5235	91.8636
12/11/02	57.6240	43.1834	18.8432	0.0000	67.5235	91.8636

Hyalella azteca

# 96-hr Freshwater Sediment Survival and Chemistry Results AMEC Bioassay Laboratory

Client: Internal (Sauget #4)	Test Organism: H. azteca
Site ID: CuCl2	Start Date/Time: 12/13/2002
Analysts: JR	End Date/Time: 17:17:02 / 1540

Conc./Site			vival		Dissoli						(pH a				Cond 24						eratu 48		
mg/L	Rep		96			48		90	0	7.84	40	I 7 0/	10 o.J	<b>\$7.</b> /	(V2/	C26-	7/~	02-2	<b>-</b>				
Cont.	A	10	10	8.4	8.6	0.6	0.1	0.5	7.76	1.04	17. 8	1721	0,27		050	1 CO	ده٥	06-	-0.1	000			
	В	10	10																				
	С	10	10										,										
<u> </u>	D	(0	10					100		700		J-1-7/	0 1	200	0.0-7	500	V~ (	021	70.7	20.7	2	210	20.2
0.1975	Α.	w		8.6	8.8	9.7	77	8.2	7.77	1,0~	1 4 8 2	7.10	10.18	831	821	ص) لا	N > A	031	ر بها	d-0.0	20,1	27.0	20.2
	В	lo	9																				
	C	(0	9																				
	D	10	1/5									757	<i>d</i> -~		0.07	(/20	0,000	doa	-		7	215	ファ
0.375	Α	10		8.6	8.5	8.4	8.3	8.(_	7.40	7.91	7.89	7.41	0.01	<i>F30</i>	826	74)	ハン	00%	<b>4</b> 0.)	201	(C)	01-0	0.2
	В	lo	19																				
	С	10	7																				
	D	10	9									-100			6517	V-	2//0	10		04.	23	50 (E)	7.7
0.75	Α	fo_		8.6	8.6	<i>X</i> .5	83	8-2	7.76	1791	7.90	77)	8.08	821	744	023	877	ساحظ	<i>(0.</i> (	20.1	60.1	UD	<i>W.</i> 7
	В	10	8																				
	С	10	5_																				
	D	10	10										7 2		COL	(C	9777	<i>A</i> ->\			400		10.2
1.5	A	lo		8.6	8.6	<i>X</i> · S	13.2	8.3	7.71	1.85	1,10	14,13	77,00	861	819	0/+	070	Ox/	T-0. (	1 0%	(7)	2/.3	20,7
	В	(0	3																				
	C	(0	3																			40	
	D	(0	3					<b>3</b>		-1	0 0				0/5/2	<b>Υ</b> Υ	C/F/	40		201	7.1.7		
3.0	Α	LO	0	8.6	8.6	8.5	[8.)	8.2	7.57	7774	<i>† Y</i>	1 491	7.03	812	1009	104	XS 4	1224	4.3	ושע	[ [ ]	1826	71,01
	В	lo	2																				
	С	LO.	<u> </u>																				
	D	10	1-7																				

AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

QA Check: 1/9/63 AH

Final Review: 1/1/03

		٠.	A	mphipod 96-Hr Survival Bi	oassay-96 Hr Sur	vival
Start Date:	12/13/2002		Test ID:	021213HARA	Sample ID:	REF-Ref Toxicant
End Date:	12/17/2002		Lab ID:	<b>AEESD-AMEC Bioassay SI</b>	Sample Type:	CUCL-Copper chloride
Sample Date:			Protocol:	ASTM 93	Test Species:	HA-Hyalella azteca
Comments:						
Conc-ug/L	1	2	3	4	٠٠,	
L-Lab Control	1.0000	1.0000	1.0000	1.0000		
197.5	0.8000	0.9000	0.9000	1.0000		,
375	1.0000	0.9000	0.7000	0.9000		
750	0.7000	0.8000	0.5000	1.0000		
1500	0.5000	0.3000	0.3000	0.5000		•
3000	0.0000	0.2000	0.2000	0.2000		•

		_	Tra	ansform:	Arcsin Sc	uare Roof		Rank	1-Tailed	Number	Total
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4			0	40
197.5	0.9000	0.9000	1.2543	1.1071	1.4120	9.935	4	12.00	10.00	4	40
375	0.8750	0.8750	1.2253	0.9912	1.4120	14.199	4	12.00	10.00	5	40
750	0.7500	0.7500	1.0739	0.7854	1.4120	24.371	4	12.00	10.00	10	40
*1500	0.4000	0.4000	0.6825	0.5796	0.7854	17.405	4	10.00	10.00	24	40
*3000	0.1500	0.1500	0.3874	0.1588	0.4636	39.345	4	10.00	10.00	34	40

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	rtion (p >	0.01)		0.96151	0.884	-0.0359	0.69755
Equality of variance cannot be co	nfirmed	•	•				÷	
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	750	1500	1060.66			· ·		•

				Maxir	num Likeliho	od-Probit	:				
Parameter	Value	SE	95% Fidu	cial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	ite
Slope	2.11993	0.27723	1.57656	2.6633	0	4.12896	7.81472	0.25	3.0666	0.47171	3
Intercept	-1.501	0.82917	-3.1261	0.12419							
TSCR						1.0			- 72	<del>1</del>	
Point	Probits	ug/L	95% Fidu	cial Limits	-	0.9			. ///	<b>-</b>	
EC01	2.674	93.1603	40.5418	154.93		-		•	#/		
EC05	3.355	195.299	107.853	284.024		0.8 -			- <b>//</b> /-		
EC10	3.718	289.785	180.449	395.077		0.7 -			:/ <b>/</b> /	i	
EC15	3.964	378.182	253.984	496.298		-			<u>//</u> /		
EC20	4.158	467.301	331.561	597.997		Ë -			<i>III</i>		
EC25	4.326	560.318	414.528	705.461		<b>2</b> 0.5 -			///:	•	
EC40	4.747	885.306	702.966	1107.51		0.4			///	٠.	
EC50	5.000	1165.74	936.148	1498.85		0.3 -	i		//	•	
EC60	5.253	1535	1219.38	2073.88		-	ì	//		i	
EC75	5.674	2425.31	1832.72	3673.52		0.2 -	ļ	///			
EC80	5.842	2908.07	2140.41	4639.22		0.1 -	•	6/1			
EC85	6.036	3593.36	2557.76	6106.58		0.0 -	<b>!</b>				
EC90	6.282	4689.49	3190.93	8654.69		0.0	<del>1 11111111111111</del> 1 10	400 4	000 400	10 40000	
EC95	6.645	6958.26	4411.53	14569			1 10	100 1	000 1000	0 10000 0	
EC99	7.326	14587.2	8043.44	38969.6				Dose u			

Amphipod 96-Hr Survival Bioassay-96 Hr Survival

Start Date: End Date:

12/13/2002 12/17/2002 Test ID: 021213HARA

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: REF-Ref Toxicant **CUCL-Copper chloride** 

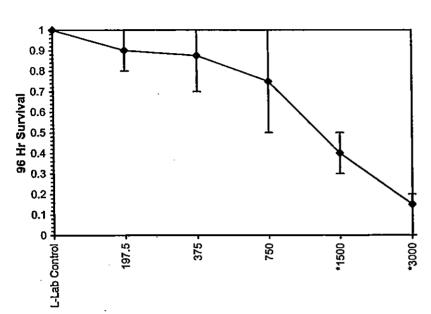
Sample Date: Comments:

Protocol: ASTM 93

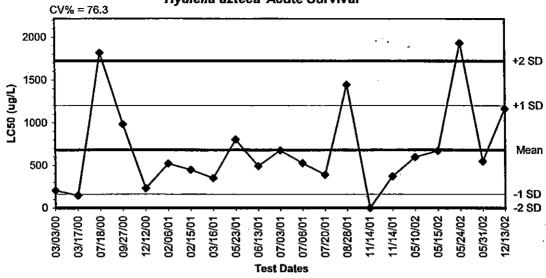
Test Species:

HA-Hyalella azteca

Dose-Response Plot



## Copper (II) Chloride Reference Toxicant Control Chart -*Hyalella azteca* Acute Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/03/00	203.5576	681.5309	161.3517	0.0000	1201.7101	1721.8893
03/17/00	146.8149	681.5309	161.3517	0.0000	1201.7101	1721.8893
07/18/00	1817.5541	681.5309	161.3517	0.0000	1201.7101	1721.8893
09/27/00	982.3056	681.5309	161.3517	0.0000	1201.7101	1721.8893
12/12/00	230.2174	681.5309	161.3517	0.0000	1201.7101	1721.8893
02/06/01	519.8706	681.5309	161.3517	0.0000	1201.7101	1721.8893
02/15/01	447.9034	681.5309	161.3517	0.0000	1201.7101	1721.8893
03/16/01	350.8374	681.5309	161.3517	0.0000	1201.7101	1721.8893
05/23/01	803.5751	681.5309	161.3517	0.0000	1201.7101	1721.8893
06/13/01	491.3767	681.5309	161.3517	0.0000	1201.7101	1721.8893
07/03/01	676.3369	681.5309	161.3517	0.0000	1201.7101	1721.8893
07/06/01	526.2626	681.5309	161.3517	0.0000	1201.7101	1721.8893
07/20/01	389.7241	681.5309	161.3517	0.0000	1201.7101	1721.8893
08/28/01	1444.6654	681.5309	161.3517	0.0000	1201.7101	1721.8893
11/14/01	0.3712	681.5309	161.3517	0.0000	1201.7101	1721.8893
11/14/01	371.1761	681.5309	161.3517	0.0000	1201.7101	1721.8893
05/10/02	597.1113	681.5309	161.3517	0.0000	1201.7101	1721.8893
05/15/02	670.4742	681.5309	161.3517	0.0000	1201.7101	1721.8893
05/24/02	1930.3212	681.5309	161.3517	0.0000	1201.7101	1721.8893
05/31/02	545.9552	681.5309	161.3517	0.0000	1201.7101	1721.8893
12/13/02	1165.7377	681.5309	161.3517	0.0000	1201.7101	1721.8893

Chironomus tentans

### 96-hr Freshwater Sediment Survival and Chemistry Results AMEC Bioassay Laboratory

Client: Internal (Sauget #4)		Test Organism: C. tentans	
Site ID: CuCl2		Start Date/Time: -12/13/2002- 12/17/02	1730
	•	End Date/Time: 12/2/162	
Analysts: JR			

Conc/Site		Sur	vival		Dissol	ved O	(mg/l	)		pH	(pH u	nets)			Cond	denu).	os/¢m)			Temp			
mg/L	Rep	0	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	7.2	96
Cont.	Α	3	7_	8.4	6.8	6,0	55	6.3	7.76	5/1/	7.77		7.61	834	<u>કાજ</u>	795	794	195	70.4	20.5	20.3	202	10.2
	В	10	10							1/4													
	С	9	10																				
	D	2	16																	7			
0.1975	Α	9	10_	8.6	72	6.5	(e.D	6.5	7.77	1.67	7.69	7.74	7.65	83)	810	780	780	787	70.3	00	<u>ک.۵کہ</u>	d() Z	20,2
	В	9	5																				
	С	9	7																				
	D	9	q													20-	1.5	770		ور دوسه	2.0		
0.375	Α	0	io	2.6	7.4	9.0	4.0	1.2	7.50	17.99	7.67	17.74	1.10	830	<del> %</del> 11	/ 8 /	788	787	70.1	(20.0	5.0K	<i>2</i> 0.2	202
	В	2	q																				
	C_	(0	ß																				
	D	10	9													790		うさへ		7.0	74.7		22.5
0.75	A	10	1	8.6	<i>د</i> لا، ك	<u>'[7.0</u>	6.4	14	7.76	1791	7.70	17.74	1.16	827	905	-4.0	782		40.1	10.5	د عد	るいろ	202
	В	D	6																				
	С	10	1																				
	D	0	2					- · ·		La ar			7 77	Car	7/01	773	770	าาด		202		00.2	370.2
1.5	Α	10	Ò	8.6	4.\	/・フ	16.5	9٠	7 ( )	1.70	1.15			8 -1	1201		118			0, )	20,3	30.2	202
ļ	В	10	٥																				
	С	10	0																				
	D	10	1		<b>1</b>	100	1 0	0 ()	-77	771	1276	771	7 81	C 17	106	<del></del>	フフィ	7.72	7.0 7	20 R	20.7	207	000
3.0	A	10	٥	14.6	<u>[D.)</u>	17-7	10.7	V.0	(,) /	1.16	1 1.02	وا ا	0.0		1/3/				<b>14.3</b>		<i>~••</i>		
	В	10	1																				
	Ç_	10	0		1																		
<u></u>	D	lo_	<u> </u>		1										<u> </u>	(protestation	HEREGER	<u>intermeter</u>		Falesticists	-1-251-251-1	participal	and the state of

AMEC Bioassay Laboratory - 5550 Morehouse Dr., Suite B San Diego, CA 92121.

QA Check: 9011 B

Final Review: A 1/4/08

	-			Chironomus tentans	-96 Hr Survival	
Start Date:	12/17/2002		Test ID:	021217CTRA	Sample ID:	REF-Ref Toxicant
End Date:	12/21/2002		Lab ID:	<b>AEESD-AMEC Bioassay SI</b>	Sample Type:	CUCL-Copper chloride
Sample Date:			Protocol:	ASTM 93	Test Species:	CT-Chironomus tentans
Comments:						
Conc-mg/L	1	2	3	4		
L-Lab Control	0.7000	1.0000	1.0000	1.0000		<u> </u>
0.1975	1.0000	0.5000	0.7000	0.9000		
0.375	1.0000	0.9000	0.8000	0.9000		
0.75	0.1000	0.0000	0.1000	0.2000		
1.5	0.0000	0.0000	0.0000	0.1000		
3	0.0000	0.1000	0.0000	0.0000		

		_	Tra	ansform:	Arcsin Sc	uare Roof	t T		1-Tailed		Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
L-Lab Control	0.9250	1.0000	1.3068	0.9912	1.4120	16.103	4			· · · ·	3	40
0.1975	0.7750	0.8378	1.1094	0.7854	1.4120	24.960	4	1.682	2.410	0.2828	9	40
0.375	0.9000	0.9730	1.2543	1.1071	1.4120	9.935	4	0.447	2.410	0.2828	4	40
*0.75	0.1000	0.1081	0.3165	0.1588	0.4636	39.374	4	8.438	2.410	0.2828	36	40
*1.5	0.0250	0.0270	0.1995	0.1588	0.3218	40.840	4 .	9.434	2.410	0.2828	39	40
*3	0.0250	0.0270	0.1995	0.1588	0.3218	40.840	4	9.434	2.410	0.2828	39	40

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non	mal distribu	tion (p >	0.01)		0.94208		0.884		-0.4486	0.56314
Bartlett's Test indicates equal var	iances (p =	0.25)			6.62399	-	15.0863	-		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	0.375	0.75	0.53033		0.20231	0.21709	1.18828	0.02755	2.1E-09	5, 18

								<u> </u>			
				ximun		od-Probit					
Parameter	Value	<u>\$E</u>	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	lte:
Slope	4.45893	3.26583	-5.9344 14.8523		0.075	50.9184	7.81472	5.1E-11	-0.2389	0.22427	4
Intercept	6.0654	0.94048	3.07238 9.05842								
TSCR	0.11092	0.16567	-0.4163 0.63814			1.0		· · · · · · · · · · · · · · · · · · ·	<u> </u>	<del> </del>	
Point	Probits	mg/L	95% Fiducial Limits			-			<b>*</b>	1	
EC01	2.674	0.17351				0.9		• /		1	
EC05	3.355	0.2467	•			0.8 -			•		
EC10	3.718	0.29761				0.7				i	
EC15	3.964	0.33777	•	•						1	
EC20	4.158	0.37352	•			<b>6</b> 0.6 n 00.5 -	-	- /			
EC25	4.326	0.40719	)			00.5		- I			
EC40	4.747	0.50611				ĝ".		- /			-
EC50	5.000	0.57685	}			\$0.4		- /			'
EC60	5.253	0.65748				0.3		1		1	
EC75	5.674	0.8172			• •	-					
EC80	5.842	0.89087	,			0.2 -	•	/		l l	
EC85	6.036	0.98515	•			0.1 -				٠ ,	
EC90	6.282					00		•			
EC95	6.645		•		-	0.0 -		7 1 1 1 1 1 1 1 1			
EC99	7.326					0	.1	. 1		10	
			i (p = 5.09E-11)					Dose	mg/L	•	

Chironomus tentans-96 Hr Survival

Start Date: End Date:

12/17/2002 12/21/2002 Test ID: 021217CTRA

Sample ID: Lab ID: AEESD-AMEC Bioassay SD Sample Type: **REF-Ref Toxicant CUCL-Copper chloride** CT-Chironomus tentans

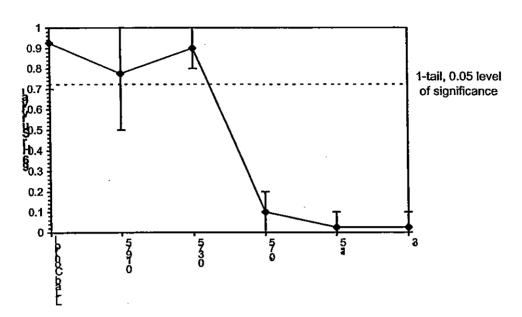
Sample Date: Comments:

Protocol: ASTM 93

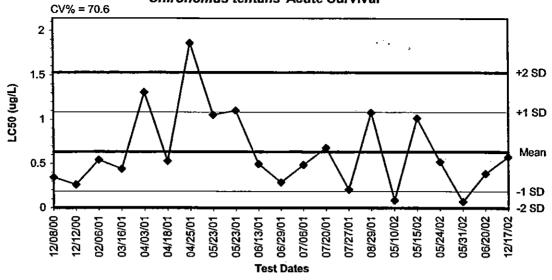
**Test Species:** 

**Dose-Response Plot** 





# Copper (II) Chloride Reference Toxicant Control Chart - Chironomus tentans Acute Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 \$D
12/08/00	0.3450	0.6340	0.1862	0.0000	1.0818	1.5296
12/12/00	0.2624	0.6340	0.1862	0.0000	1.0818	1.5296
02/06/01	0.5406	0.6340	0.1862	0.0000	1.0818	1.5296
03/16/01	0.4387	0.6340	0.1862	0.0000	1.0818	1.5296
04/03/01	1.3058	0.6340	0.1862	0.0000	1.0818	1.5296
04/18/01	0.5286	0.6340	0.1862	0.0000	1.0818	1.5296
04/25/01	1.8595	0.6340	0.1862	0.0000	1.0818	1.5296
05/23/01	1.0523	0.6340	0.1862	0.0000	1.0818	1.5296
05/23/01	1.1007	0.6340	0.1862	0.0000	1.0818	1.5296
06/13/01	0.4961	0.6340	0.1862	0.0000	1.0818	1.5296
06/29/01	0.2863	0.6340	0.1862	0.0000	1.0818	1.5296
07/06/01	0.4850	0.6340	0.1862	0.0000	1.0818	1.5296
07/20/01	0.6776	0.6340	0.1862	0.0000	1.0818	1.5296
07/27/01	0.2061	0.6340	0.1862	0.0000	1.0818	1.5296
08/29/01	1.0777	0.6340	0.1862	0.0000	1.0818	1.5296
05/10/02	0.0856	0.6340	0.1862	0.0000	1.0818	1.5296
05/15/02	1.0140	0.6340	0.1862	0.0000	1.0818	1.5296
05/24/02	0.5191	0.6340	0.1862	0.0000	1.0818	1.5296
05/31/02	0.0703	0.6340	0.1862	0.0000	1.0818	1.5296
06/20/02	0.3863	0.6340	0.1862	0.0000	1.0818	1.5296
12/17/02	0.5769	0.6340	0.1862	0.00001	1.0818	1.5296

Brachionus calyciflorus

Acute Exposure

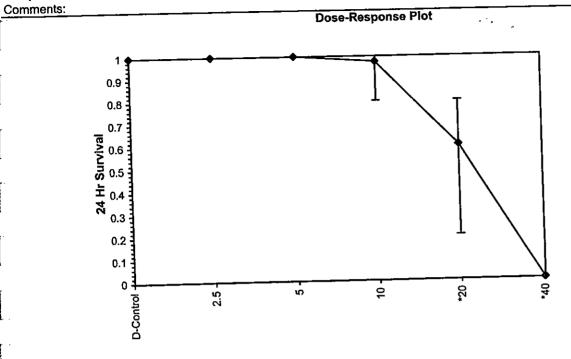
1						Rotifer To	est-24 Hr	Survival	<del></del>	
	Start Date:	4/11/03		Test ID:	RA041103	):	REF-REFERENCE TOXICANT			
1	End Date:	4/12/03			WAAEE-A				KCR7-Potassium dichromate	
1	Sample Date:	4/11/03		Protocol:	ASTM E14	140	-	Test Spec	-	BC-Brachionus calyciflorus
•	Comments:									20 Bradillorida Carychiolida
E.	Conc-mg/L	1	2	3	4	5	6	7	- 8	<del>-</del>
	D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
ğ	2.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
8	10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	
1	20	0.6000	0.8000	0.8000	0.2000	0.6000	0.2000	0.8000	0.8000	
L	40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

	- "		_	Tra	ansform:	Arcsin Sc	uare Root		Rank	1-Talled	Number	Total
ā.	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Ĭ	D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
1.	2.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	0	40
	5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	46.00	Ō	40
į	10	0.9750	0.9750	1.3155	1.1071	1.3453	6.400	8	64.00	46.00	1	40
Ĭ	*20	0.6000	0.6000	0.8910	0.4636	1.1071	31.522	8	36.00	46.00	16	40
•	<del>*</del> 40	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8	36.00	46.00	40	40

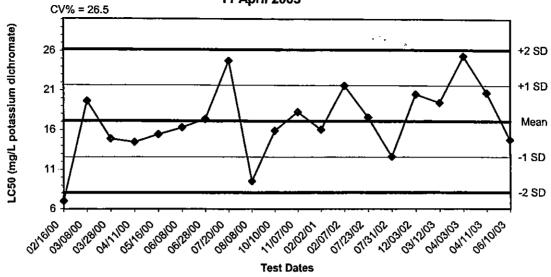
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	n-normal dis	stribution	(p <= 0.01)		0.56763	0.929	-1.9088	8.20118
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	10	20	14.1421					

				Maxin	num Likeliho	od-Probit					
Parameter	Value	SE	95% Fidu	ciał Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.43579	1.26571	4.95499	9.91659	0	2.23152	7.81472	0.53	1.31675	0.13448	5
Intercept	-4.791	1.67411	-8.0723	-1.5098						,	
TSCR						1.0 -					
Point	Probits	mg/L	95% Fldu	cial Limits		Ą			$\mathcal{L}$		
EC01	2.674	10.0899	6.88693	12.3519		0.9			- ///		
EC05	3,355	12.4606	9.37427	14.5909		0.8			- ///		
EC10	3.718	13.9443	11.0185	15.9901		0.7			-H		
_EC15	3.964	15.0439	12.2642	17.0421		4			-H	Ì	
EC20	4.158	15.9794	13.332	17.9568		Response 9.0			<b>  </b>		
⇒EC25	4.326	16.8282	14.2993	18.8101		5 _{0.5} ]			- ///		
EC40	4.747	19.1723	16.8996	21.3448		કું <u>.</u> ન			- ///		
···EC50	5.000	20,737	18.5232	23.2343		2 0.4 ]			/ <b>f</b> f		
EC60	5.253	22.4294	20.1506	25.4822		0.3		-	///		
EC75	5.674	25.5538	22.8482	30.1393		۱,,			///		
EC80	5.842	26.9111	23.9291	32.3328		0.2		i	/ [ ]		
EC85	6.036	28.5845	25.2088	35.1543		0.1			//		
EC90	6.282	30.8386	26.8628	39.1351		0.0			<u>'/</u>		
EC95	6.645	34,5107	29.4343	46.0065		0.0 1		10	,	100	
EC99	7.326	42.6191	34.7645	62.6321		•		Dose n	11	100	

Start Date: 4/11/03 Test ID: RA041103BC Sample ID: REF-REFERENCE TOXICANT
Ind Date: 4/12/03 Lab ID: WAAEE-AMEC NW Bioassa; Sample Type: KCR7-Potassium dichromate
Sample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus



#### Control Chart - *Brachionus calyciflorus* Acute Survival 11 April 2003



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/16/00	6.9809	17.1151	12.5841	8.0531	21.6461	26.1771
03/08/00	19.6209	17.1151	12.5841	8.0531	21.6461	26.1771
03/28/00	14.8792	17.1151	12.5841	8.0531	21.6461	26.1771
04/11/00	14.4568	17.1151	12.5841	8.0531	21.6461	26.1771
05/16/00	15.4306	17.1151	12.5841	8.0531	21.6461	26.1771
06/08/00	16.2990	17.1151	12.5841	8.0531	21.6461	26.1771
06/28/00	17.3530	17.1151	12.5841	8.0531	21.6461	26.1771
07/20/00	24.7388	17.1151	12.5841	8,0531	21.6461	26,1771
08/08/00	9.4911	17.1151	12.5841	8.0531	21.6461	26.1771
10/10/00	15.9070	17.1151	12.5841	8.0531	21.6461	26.1771
11/07/00	18.2769	17.1151	12.5841	8.0531	21.6461	26.1771
02/02/01	16.0566	17.1151	12.5841	8.0531	21.6461	
02/07/02	21.6086	17.1151	12.5841	8.0531	21.6461	
07/23/02	17.6047	17.1151	12.5841	8.0531	21.6461	
07/31/02	12.6415	17.1151	12.5841	8.0531	21.6461	
12/03/02	20.5539	17.1151	12.5841	8.0531	21.6461	
03/12/03	19.4756	17.1151	12.5841	8.0531	1	
04/03/03	25.4134	17.1151	12.5841	8.0531	21.6461	N i
04/11/03	20.7370	17.1151	12.5841	8.0531	21.6461	26.1771
06/10/03	14.7772	17.1151	12.5841	8.0531	21.6461	26.1771

Brachionus calyciflorus
Chronic Exposure

•						Rotife	er Test-48	B Hr		
	Start Date:	4/11/03			RT041103			Sample ID		REF-REFERENCE TOXICANT
	End Date:	4/13/03	l	_ab ID: '	WAAEE-AI	MEC NW				KCR7-Potassium dichromate
١.	Sample Date:	4/11/03	,	Protocol: /	ASTM E14	40		Test Speci	es:	BC-Brachionus calyciflorus
	Comments:									
1	Conc-mg/L	1	2	3	4	<u> 5</u>	6	<u> </u>	- 8	
c c	D-Control	4.0000	6.0000	4.0000	4.0000	5.0000	6.0000	4.0000	6.0000	
1	1.25	4.0000	4.0000	5.0000	4.0000	4.0000	4.0000	5.0000	3.0000	
	2.5		4.0000	2.0000	2.0000	3.0000	2.0000	0.0000	3.0000	·
ſ	5		1.0000	1.0000	2.0000	0.0000	1.0000	3.0000	1.0000	1
	10		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
4	20		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

<del></del>			Transform: Untransformed				Rank	1-Tailed	isoto		
Conc-mg/L	Mean	N-Mean -	Mean	Min	Max	CV%	N	Sum	Critical		N-Mean
D-Control	4.8750	1.0000	4.8750	4.0000	6.0000	20.329	8			4.8750	1.0000
1.25	4.1250	0.8462	4.1250	3.0000	5.0000	15.536	8	55.00	46.00	4.1250	0.8462
*2.5	2.5000	•	2.5000	0.0000	4.0000	52.372	8	40.00	46.00	2.5000	0.5128
2.5 *5	1.1250	•••	1.1250	0.0000	3.0000	88.092	8	36.00	46.00	1.1250	0.2308
•			0.0000	0.0000	0.0000	0.000	8	36.00	46.00	0.0000	0.0000
*10	0.0000		0.0000	0.0000	0.0000	0.000	8	36.00	46.00	0.0000	0.0000
*20	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	•	50.00		• • • • • • • • • • • • • • • • • • • •	

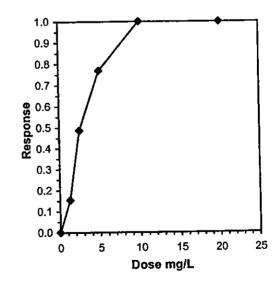
Auxiliana Toete	Statistic	Critical	Skew Kurt
Auxiliary Tests Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.91765	0.929	-0.1445 1.72415
Equality of variance cannot be confirmed			
Hypothesis Test (1-tail, 0.05) NOEC LOEC ChV			

Steel's Many-One Rank Test 1.25 2.5 1.76777

Linear Interpolation	(200	Resamples)	

Point	mg/L	SD	95%	CL	Skew
IC05*	0.4063	0.3376	0.2238	1.3824	1.4917
IC10*	0.8125	0.3373	0.4477	1.5224	0.5110
IC15*	1.2188	0.3006	0.6715	1.7003	0.0103
IC20	1.4231	0.2702	0.8953	1.9323	-0.0256
1C25	1.6106	0.2742	1.1191	2,2225	0.4514
IC40	2.1731	0.3383	1.7286	3.0535	0.9042
IC50	2.6136	0.4633	2.0106	3.6538	0.5080
1000	2.0100	3.1000			

^{*} indicates IC estimate less than the lowest concentration



Rotifer Test-48 Hr

Start Date: End Date:

4/11/03

4/13/03

Test ID: RT041103BC

Lab ID: WAAEE-AMEC NW Bioassay Sample Type: Protocol: ASTM E1440

Test Species:

Sample ID:

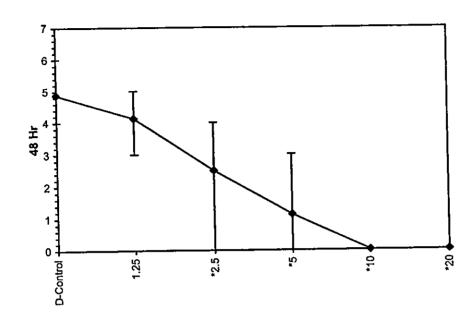
KCR7-Potassium dichromate

**BC-Brachionus** calyciflorus

REF-REFERENCE TOXICANT

Sample Date: 4/11/03 Comments:

Dose-Response Plot



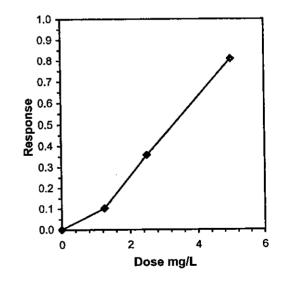
		*-			Ro	tifer Test	:-r		
Start Date: End Date: Sample Date:	4/11/03 4/13/03 4/11/03	ı	Lab ID:	RT041103 WAAEE-A ASTM E14	MEC NW	Bioassay	Sample ID Sample Ty Test Speci	pe:	REF-REFERENCE TOXICANT KCR7-Potassium dichromate BC-Brachionus calyciflorus
Comments:	<del></del> 1	2	3	4	5	6	7	8	
D-Control	0.6931	0.8959	0.6931	0.6931	0.8047	0.8959	0.6931	0.8959	
1.25	0.6931	0.6931	0.8047	0.6931	0.6931	0.6931	0.8047	0.5493	
2.5	0.6931	0.6931	0.3466	0.3466	0.5493	0.3466	0.5493		
5	0.0000	0.0000	0.3466	0.0000	0.5493	0.0000			

_				Transform: Untransformed						1-Tailed	Isotonic		
(	Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
	D-Control	0.7831	1.0000	0.7831	0.6931	0.8959	12.860	8			-	0.7831	1.0000
	1.25	0.7031	0.8978	0.7031	0.5493	0.8047	11.379	8	1.076	2.252	0.1676	0.7031	0.8978
	*2.5	0.5035	0.6430	0.5035	0.3466	0.6931	31.402	7	3.630	2.252	0.1735	0.5035	0.6430
	*5	0.1493		0.1493	0.0000	0.5493	160.759	6	7.884	2.252	0.1811	0.1493	0.1907

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non		0.90193		0.898		0.83344	0.61247			
Bartlett's Test indicates equal vari			•		8.10699		11.3449			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	1.25	2.5	1.76777		0.18105	0.23119	0.53204	0.02216	1.6E-07	3, 25

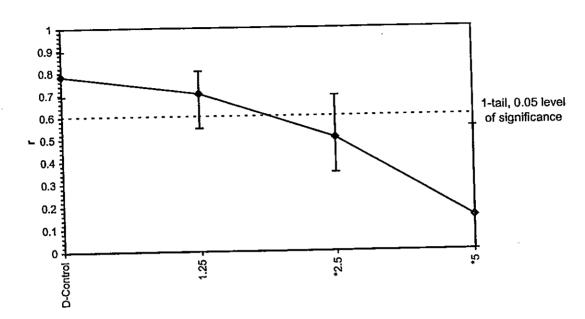
			Linear Interpolation (200 Resamples)						
Point	mg/L	SD	95% CL	.(Exp)	Skew				
IC05*	0.6114	0.3394	0.2317	1.6599	0.8331				
IC10*	1.2227	0.3014	0.4635	1.8258	-0.0208				
IC15	1,4843	0.2666	0.8001	2,1401	0.4506	1,0			
IC20	1.7296	0.2661	1.1737	2.5774	0.7064	0.9			
IC25	1,9749	0.2894	1.4655	2.8325	0.6721	٠٦			
IC40	2.7375	0.3445	2.0544	3.6362	0.4735	0.8 -			
IC50	3,2902					0.7			

^{*} indicates IC estimate less than the lowest concentration

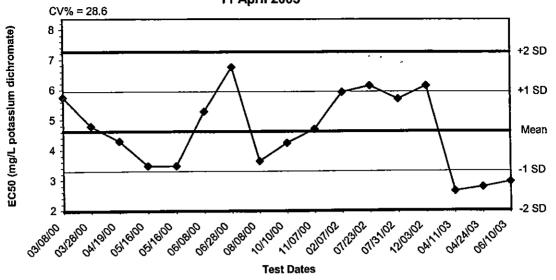


Start Date: 4/11/03 Test ID: RT041103BC Sample ID: REF-REFERENCE TOXICANT
End Date: 4/13/03 Lab ID: WAAEE-AMEC NW Bioassa; Sample Type: KCR7-Potassium dichromate
Sample Date: 4/11/03 Protocol: ASTM E1440 Test Species: BC-Brachionus calyciflorus
Comments:

Dose-Response Plot



#### Control Chart - *Brachionus calyciflorus* Chronic Population Increase 11 April 2003



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/08/00	5.7500	4.6205	3.2970	1.9736	5.9439	7.2673
03/28/00	4.7857	4.6205	3.2970	1.9736	5.9439	7.2673
04/19/00	4,2949	4.6205	3.2970	1.9736	5.9439	7.2673
05/16/00	3,4722	4.6205	3.2970	1.9736	5.9439	7.2673
05/16/00	3.4722	4.6205	3.2970	1.9736	5.9439	7.2673
06/08/00	5.2778	4.6205	3.2970	1.9736	5.9439	7.2673
06/28/00	6.7568	4.6205	3.2970	1.9736	5.9439	7.2673
08/08/00	3.6310	4.6205	3.2970	1.9736	5.9439	7.2673
10/10/00	4.2361	4.6205	3.2970	1.9736	5.9439	7.2673
11/07/00	4.6875	4.6205	3.2970	1.9736	5.9439	7.2673
02/07/02	5,9211	4.6205	3.2970	1.9736	5.9439	7.2673
07/23/02	6.1364	4.6205	3.2970	1.9736	5.9439	7.2673
07/31/02	5.7000	4.6205	3.2970	1.9736	5.9439	7.2673
12/03/02	i .	4.6205	3.2970	1.9736	5.9439	7.2673
04/11/03	2.6136	4.6205	3.2970	1.9736	1	7.2673
04/24/03	h	4.6205	3.2970	1.9736	5.9439	7.2673
06/10/03	1	4.6205	3.2970	1.9736	5.9439	7.2673

Appendix E
Chain-of-Custody Forms



June 6, 2002

Mr. Steve Carlson Laboratory Manager AMEC Earth & Environmental Bioassay 5550 Morehouse Drive, Suite B San Diego, CA 92121

Dear Mr. Carlson,

Enclosed are the three chemicals that Paul Anderson asked I send to you to assess the toxicity via a *Selenastrum capricornutum* bioassay:

- Four 25 gram bottles of benzene sulfonic acid, sodium salt (515-42-4, Aldrich Chemical)
- One 100 g bottle of 4-hydroxybenzenesulphonic acid, sodium salt (825-90-1, Avocado Research)
- One 100 g bottle of benzene-1,3-disulfonic acid, sodium salt (831-59-4, Avocado Research).

Note that these chemicals are hygroscopic so they should be kept tightly capped and stored in a clean, dry area.

I can be contacted at AMEC's Westford, Massachusetts office at 978-692-9090, x248 if you have any questions or concerns regarding these compounds.

Sincerely,

Stephen R. Clough, Ph.D., DABT

Sr. Ecological Risk Assessor

cc: Paul Anderson, Marilyn Hoyt

AMEC Earth & Environmental, Inc.
239 Littleton Road, Suite 1B
Westford, MA 01886 USA
Tel (978) 692-9090
Fax (978- 692-6633 www.ainec.com





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PTO: IEC EARTH & ENVIRONMENTAL EVE CARLSON IN DIEGO BIOASSAY LAB DITE B ISO MOREHOUSE DR IN DIEGO CA 92121

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## STATEMENTS OF POLICY

# DEPARTMENT OF ENVIRONMENTAL PROTECTION

[ 25 PA. CODE CH. 16 ]

Request for Scientific Information; Resorcinol and Sulfonates; Statement of Policy

The Department of Environmental Protection (Department) is seeking analytical test methods, data and pertinent scientific information for Benzene Metadisulfonic Acid (BDSA), Benzene Monosulfonic Acid (BSA), p-Phenol Sulfonic Acid (p-PSA), (collectively referred to as the sulfonates) and Resorcinol.

The Department plans to propose amendments to Chapter 16, Appendix A, Table 1A (relating to water quality criteria for toxic substances). The revision to Table 1A will incorporate site-specific ambient water quality criteria for BDSA, BSA, p-PSA and Resorcinol, which were requested by AMEC Earth & Environmental (AMEC), a consultant to Beazer East, Inc. (Beazer East). Documentation to support the request was submitted to the Department on April 11, 2008, by Babst, Calland, Clements and Zomnir, on behalf of Beazer East.

For further information contact Richard H. Shertzer, Chief, Division of Water Quality Standards, Bureau of Water Standards and Facility Regulation, 11th Floor, Rachel Carson State Office Building, P. O. Box 8467, Harrisburg, PA 17105-8467, (717) 787-9637 or Michelle Moses, Assistant Counsel, Bureau of Regulatory Counsel, 9th Floor, Rachel Carson State Office Building, P. O. Box 8464, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the Pennsylvania AT&T Relay Service at (800) 654-5984 (TDD user) or (800) 654-5988 (voice users).

Beazer East has implemented environmental investigations and remediation at sites in Butler and Armstrong Counties, in cooperation with the Department and United States Environmental Protection Agency (EPA). These sites are located within an area approximately 60 square miles in size that has been designated by the Department under the Hazardous Sites Cleanup Act (HSCA) as the "Bear Creek Area Chemical Site" (BCACS). The Department has determined that environmental media (such as, soil and groundwater) within the BCACS have been impacted by the sulfonates and resorcinol. Currently, with respect to surface water, there are no ambient water quality criteria in Chapter 16 for the sulfonates or resorcinol.

Because water quality criteria have not been developed for the sulfonates or resorcinol by either the Department or the EPA, AMEC used the EPA's National guidelines to develop water quality criteria as stated in 25 Pa. Code § 16.22 (relating to criteria development).

The Department reviewed materials presented during a March 7, 2007, meeting with representatives of Beazer East, AMEC, Babst, Calland, Clements and Zomnir and draft reports prepared on behalf of Beazer East. The EPA performed an informal review of this documentation and the process used by AMEC. Based on comments forwarded to the Department from the EPA's Health and Ecological Criteria Division in the EPA Office of Science and Technology, it was determined that AMEC followed the EPA National Guidelines on toxicity testing and criteria development. However, based on a more thorough review of the calculations and data tables, the EPA provided additional recommendations to correct errors found in some reported values. AMEC revised its ambient water quality report at the request of Beazer East, and updated the report titled "Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol." This report, dated April 3, 2008, incorporates revisions provided by the EPA and the Department.

Based on the results of studies presented by AMEC on behalf of Beazer East, using established EPA protocols, the Department plans to propose the following site-specific ambient water quality criteria for Sulfonates and Resorcinol. These criteria will apply to the BCACS located within Bear Creek basin (§ 93.9s), in Armstrong and Butler Counties.

	CAS
Compound	Number
Benzene Metadisulfonic Acid	00098486
Benzene Monosulfonic Acid	00098113
p-Phenol Sulfonic Acid	00098679
Resorcinol	01084603

Analytical test methods, data and pertinent scientific information should be submitted to Richard H. Shertzer at the previous address, or may be submitted electronically by e-mail to RA-WQS@state.pa.us. A subject heading of "Request for Information—Resorcinol," and return name and address must be included in each transmission. Comments and scientific information must be received by June 22, 2009, to be considered in the development of the final criteria for Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol. Comments received by facsimile will not be accepted.

Acute AWQC	Chronic AWQC
Criterion Maximum	Criterion Continuous
Concentration (ug/l)	Concentration (ug/l)
2592000	1620000
1956000	1151000
3476000	1363000
28000	7180

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JOHN HANGER, Secretary

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